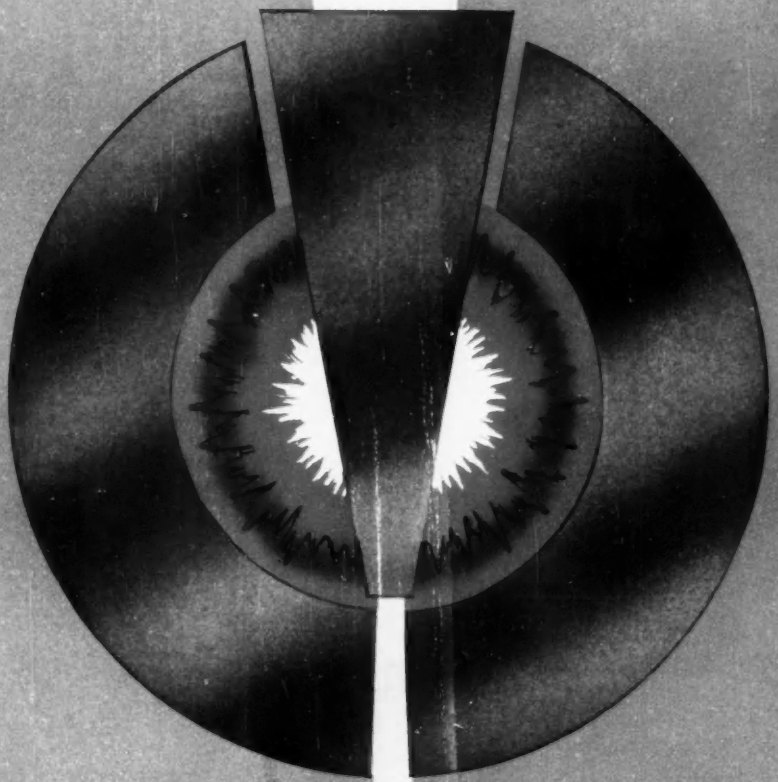
AUTOMOTIVE INDUSTRIES

SEPTEMBER 15, 1949



IN THIS ISSUE

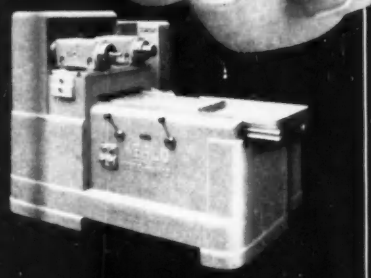
A CHILTON PUBLICATION

CONSTANT FEED

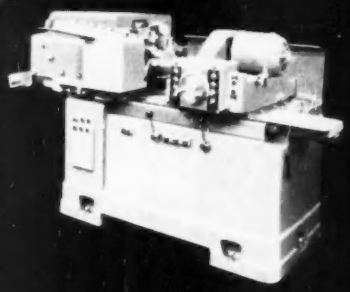
. . . AROUND THE CLOCK

That means less "down time" and more production time per shift

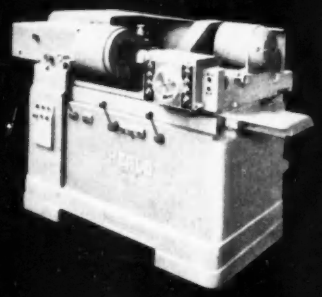
The Heald constant-feed hydraulic system is standard equipment on all new Heald production type machines.



BORE-MATICS



CENTERLESS INTERNAL GRINDERS



CHUCK TYPE INTERNALS

Temperatures may vary and oil viscosity may change—but feed rates on all new Heald grinders and Bore-Matics remain constant throughout the longest production runs.

This is made possible by the unique, constant-feed hydraulic system which is an exclusive feature of *all* of the new Heald production type machines. The Heald constant-feed system gives positive control of the hydraulic fluid throughout the entire machine, wherever it is necessary to regulate oil flow. And because feed rates stay set 24 hours a day, without the usual compensating adjustments and attention, you get more actual production time for each day's work. Accuracy is greater too, your final product is better, and scrap pieces are negligible.

Savings like this—in time, money and materials—can make a big difference in your production efficiency. So why not get in touch with your nearest Heald representative today. He will be glad to study your precision finishing operations, and show you how the new Heald machines can put your production on a more profitable basis.

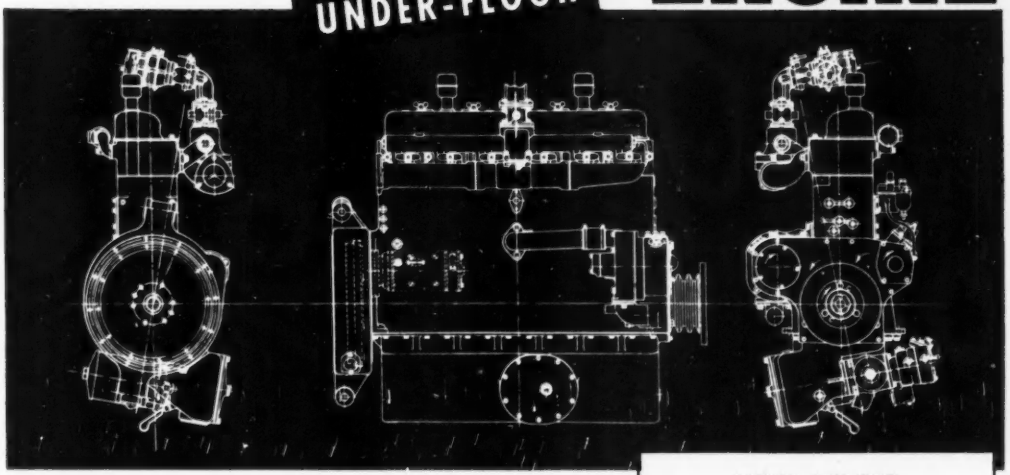
HEALD

PRECISION INTERNAL AND SURFACE GRINDERS

PRECISION BORE-MATIC FINISHING MACHINES

THE HEALD MACHINE COMPANY
Worcester 6, Mass.
Branch Offices in Chicago • Cleveland • Dayton • Detroit
Indianapolis • Lansing • New York

new WAUKESHA *Horizontal* UNDER-FLOOR ENGINE



CHECK THESE MODERN FEATURES

Crankcase—Combined crankcase and cylinder block lies in horizontal position with cylinders at 10° angle above horizontal supporting arms. Alloy iron casting is exceptionally rigid to insure constant alignment of all moving parts. Extra heavy upper and lower decks provide firm support seats for cylinder sleeves, and extended oil pan flange gives additional strength to resist distortion. The seven-bearing bridges, tied to the side-walls by generous, large radius fillets, together with the directional coolant baffles, add still further to the rigidity of the entire engine structure.

Cylinders—Renewable, wet-type cylinder sleeves of Molychrome alloy, heat-treated to provide suitable hardness and insure long life.

Pistons—Heavy-duty aluminum alloy with four straight-side rings, all above the piston pin. Piston pin is full floating, with rectangular section Tru-Arc retainers.

Connecting Rods—Drop-forged, rifle-drilled, heat-treated, and matched in sets to ¼-ounce tolerance. Caps deeply ribbed and held by two husky alloy heat-treated cap bolts and locks. Large end precision ground for steel-backed, copper-lead precision bearing. Small end has hard bronze, diamond bored bushing.

Crankshaft — Drop-forged, heat-treated alloy steel. Fully counter-balanced and mounted in seven 3¼-inch steel-backed, copper-lead high-duty precision bearings. All main journals and crankpins are hardened to test 600 Brinell. The front end has a highly efficient vibration dampner, which in combination with counter-weights insures smoothness of operation at all loads and speeds.

Valves—Exhaust valves are Stellite-faced chrome-nickel forgings seating in Stellite inserts; intake valves are chrome-nickel alloy. Dual valve springs with taper block keepers and forged spring retainers are employed. Valve guides are renewable. Valve adjustment by screw and lock-nut.

Cooling—A positive gear driven, ball bearing, packless, coolant pump with full length cylinder jackets, baffles, and porting to cylinder head, forces coolant in directed paths at high velocity to every heat-sensitive area. Scaling and sludging are reduced to a minimum.

Lubrication—The positive gear driven oil pump forces oil under pressure to every main, rod, piston pin, camshaft, idler gear stud, and oil pump drive shaft bearing. An intermittent metered pressure line leads oil to the rocker arms and valve chamber as well as to the timing gear spray and air brake compressor. A large capacity oil sump with compartmentation insures a constant oil supply at all times. Both bayonet and indicating dial gauges are provided, as well as convenient inspection and drain openings. A large waste-packed filter is mounted on the oil pan.

Governor—Waukesha-built, gear driven, enclosed and flood oiled over-speed governor; does not prevent manual speed control up to pre-determined top speed.

MODEL 140-GKB

Overall Length	50
Overall Width	49
Overall Depth	24
Maximum Drop From Support	11½
Bore and Stroke	4½ x 5½
Number of Cylinders	6
Displacement, Cu. In.	525
Number of Main Brgs.	7
Front Main Brg., Dia. x Lgth.	3¼ x 1⅝
Center Main Brg., Dia. x Lgth.	3¼ x 2 5/16
Inter. Brgs. (4), Dia. x Lgth.	3¼ x 1⅝
Rear Main Brg., Dia. x Lgth.	3¼ x 3
Conn. Rod Brg., Dia. x Lgth.	2⅝ x 1¾
Conn. Rod Lgth., C. to C.	10¼
Piston Pin, Floating, Dia. x Lgth.	1⅜ x 3⅞
Top Ring, Chrome Plated, (1) Width	⅛
Second Ring, Plain, (1) Width	⅛
Oil Central Rings, (2) Width	⅜
Flywheel Housing, S.A.E. No.	3

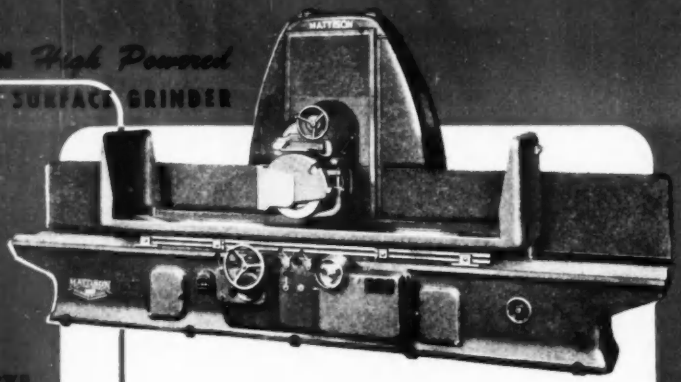
• There are lots of other details you'll want to learn. Write for full particulars or engineering consultation. No obligation.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. • *New York, Tulsa, Los Angeles*

MATTISON GRINDERS

MATTISON *High Powered*
PRECISION SURFACE GRINDER

● Mattison Machine Works, Rockford, Illinois has purchased the line of Production Grinding Machinery formerly made by the Hanchett Manufacturing Company of Big Rapids, Michigan. These machines will supplement the well-known line of Mattison High Powered Precision Surface Grinders and enables Mattison Machine Works to offer machines for handling practically all of your Surface Grinding problems on a low cost, high-production basis.



For further information on any of the Grinders listed, ask for free circulars containing complete specifications and operating data.

MATTISON GRINDER
HANCHETT ROTARY AUTOMATIC No. 72

***Grinders now built by* MATTISON**

SURFACE GRINDERS: High-Powered, Precision, Horizontal Spindle—Rotary Type, Vertical Spindle—Rotary Automatics, Vertical Spindle — Reciprocating Table Type, Vertical Spindle — Plano Type, Horizontal and Vertical Spindle.

FACE GRINDERS: Traveling Table (Hydraulic) and Traveling Wheel.

DISC GRINDERS: Single Spindle, Double Spindle, Vertical Spindle, Automatic Single Wheel.

WAY GRINDERS: Vertical Spindle for dovetails and undercuts.

ABRASIVE-BELT GRINDING AND POLISHING MACHINES for wide steel sheets, strip steel, internal tube, etc.

● For years Mattison Machine Works has successfully built High-Powered Precision Surface Grinders and will continue to build the same high quality into the entire line — through sound principles of engineering, precision manufacturing, careful workmanship and modern methods of production. Our reputation for service and careful attention to machines in the field will naturally extend over the complete line of Grinders now built by Mattison.

When in need of service or repair parts, present owners of Hanchett Grinders should contact Mattison Machine Works, Rockford, Illinois.

MATTISON MACHINE WORKS
ROCKFORD • ILLINOIS

AUTOMOTIVE INDUSTRIES

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Contents

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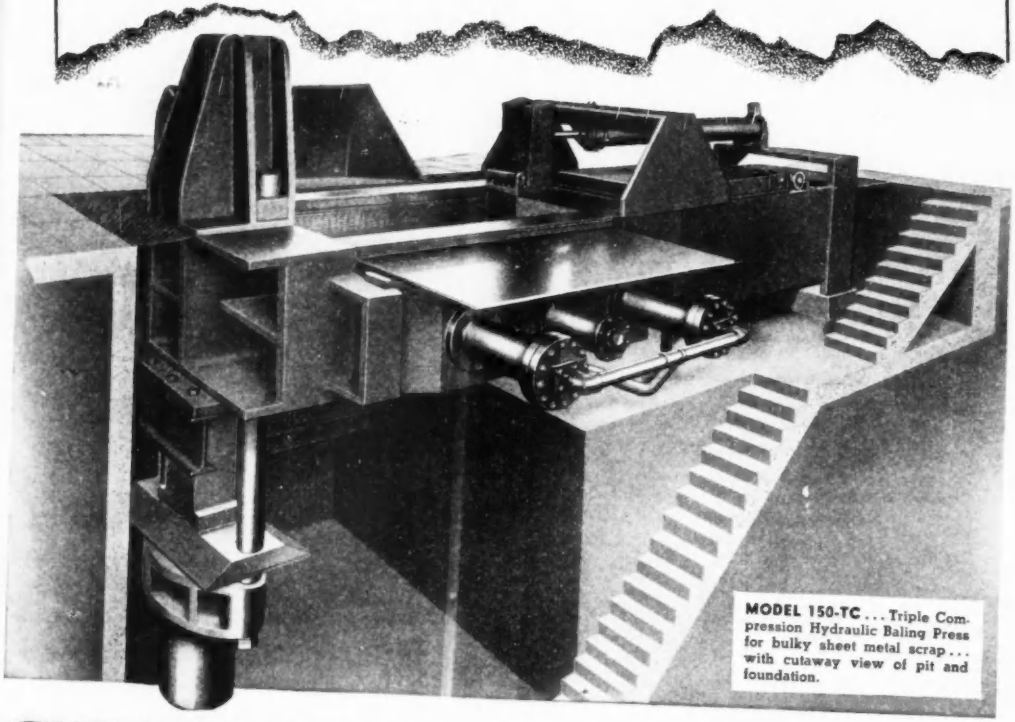
INTEGRATE YOUR PLANT
by BALING your Sheet Metal Scrap

A well organized metal working plant which generates a volume of sheet metal stampings or clippings should include equipment for processing such scrap into compact bales of correct size and density for remelting. As such, it becomes valuable "raw material" in the production of new metal — sheets, strip, bars and ingots — and contributes to the conservation of natural resources.

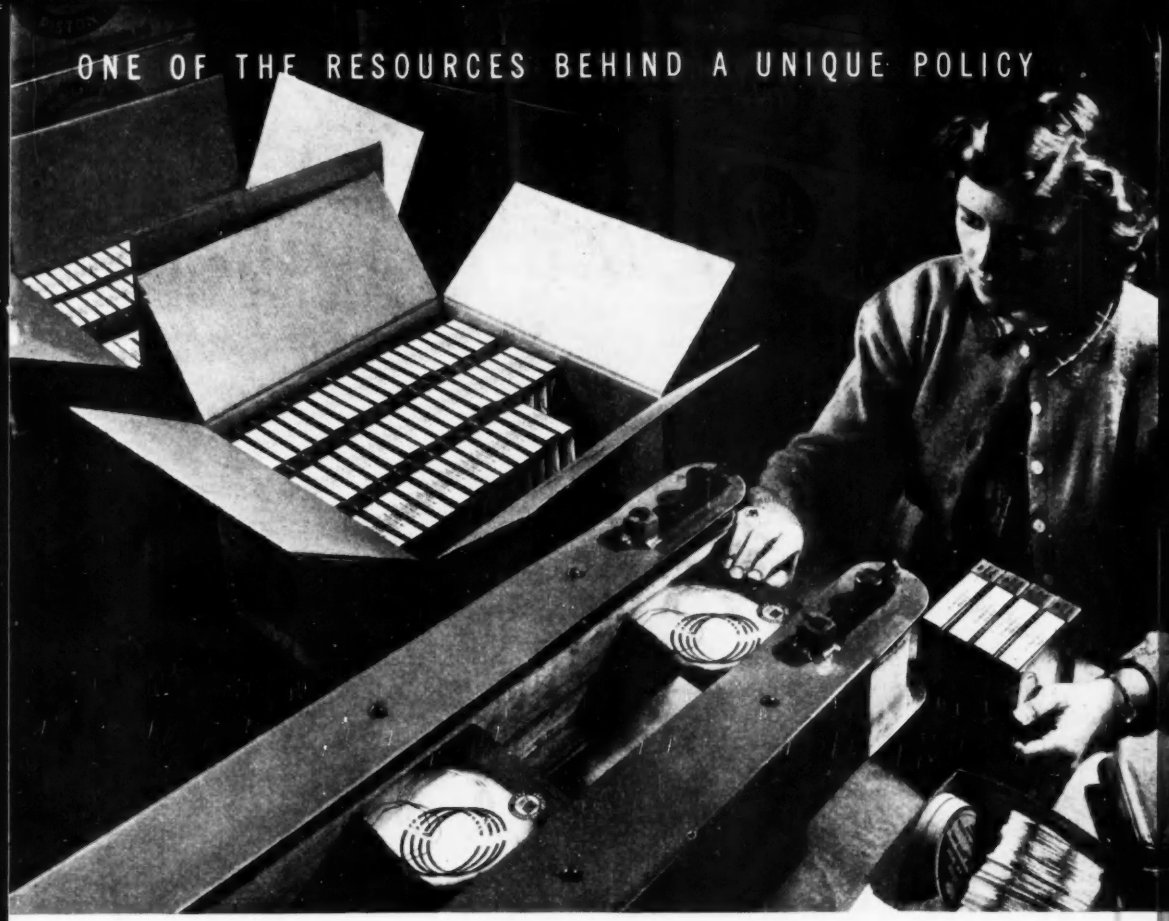
A powerful hydraulic baling press . . . carefully engineered and ruggedly constructed . . . is essential to the orderly low-cost baling of your sheet metal scrap. Galland-Henning builds such balers in a range of sizes and capacities for every industrial need, and offers you competent, experienced counsel toward establishing an efficient, profitable baling operation in your plant. Write —

GALLAND-HENNING MFG. CO.
2747 SOUTH 31ST STREET • MILWAUKEE 7, WISCONSIN



MODEL 150-TC . . . Triple Compression Hydraulic Baling Press for bulky sheet metal scrap . . . with cutaway view of pit and foundation.

GALLAND-HENNING
SCRAP METAL BALING PRESSES



HELPING CAR FACTORIES GET THAT REPLACEMENT PARTS BUSINESS

The design, production and packaging of factory-engineered and approved piston rings for the service departments of car and engine makers has been a Muskegon *specialty* for many years.

In support of these factory service departments, Muskegon has always vigorously promoted the idea of "Factory Authorized" parts and services in all of its advertising to car owners.

Factory-approved service rings are packed in complete-set boxes. In the view, above, these factory engineered service sets are being made *tamper-proof* on an automatic machine.

Complete facilities for the packaging of service rings are but one of the rich resources, in both plant and personnel, that stand behind Muskegon's *unique policy*.

Policy

"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."

MUSKEGON
Piston Rings

MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"

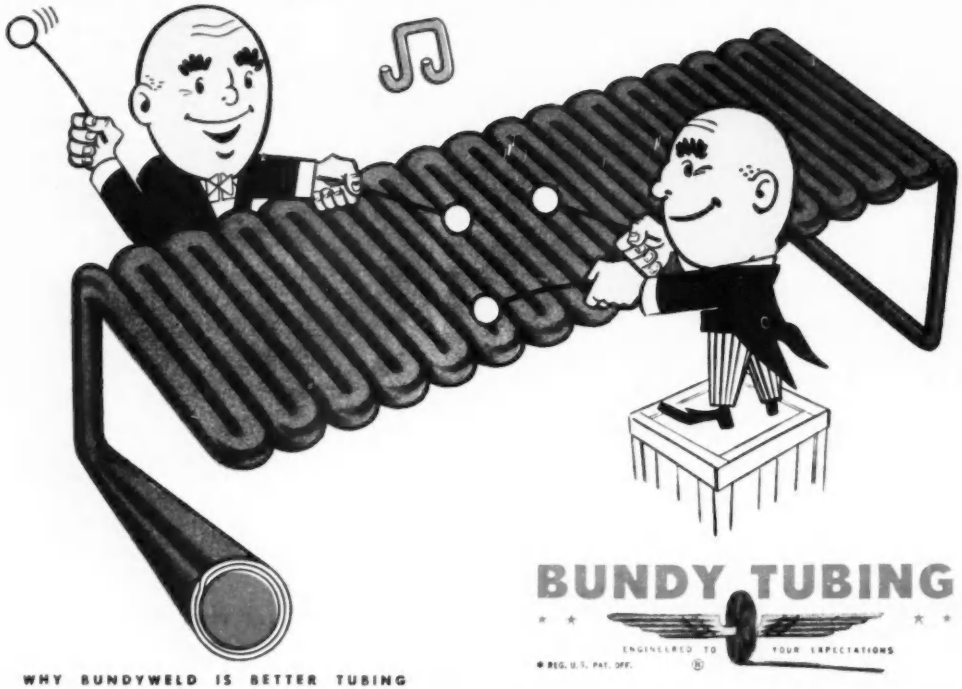
Sweet music for better automotive tubing

It's sweet music when automotive manufacturers hear *all* the advantages of Bundyweld* Tubing for fuel lines, hydraulic brake line systems and pressure lines.

So strong, so sturdy that it's already used in 95% of today's cars, Bundyweld takes vibration, shock, and pressure year after year, in gasoline- and Diesel-engined vehicles.

Double-walled from a single strip, bonded throughout, Bundyweld is lightweight, ductile . . . leakproof, too . . . and can be bent without fear of collapsing or weakening structurally. Held to close tolerances, it is easy to fabricate . . . cuts production time, lowers production expense.

Check this outstanding tubing for your tubing needs. Contact your nearest Bundy representative listed below. Or, write direct to: *Bundy Tubing Company, Detroit 14, Michigan.*



BUNDY TUBING

ENGINEERED TO YOUR EXPECTATIONS

* REG. U.S. PAT. OFF.

WHY BUNDYWELD IS BETTER TUBING

1 Bundyweld Tubing, made by a patented process, is entirely different from any other tubing. It starts as a single strip of basic metal, coated with a bonding metal.

2 This strip is continuously rolled twice laterally into tubular form. Walls of uniform thickness and concentricity are assured by close-tolerance, cold-rolled strip.

3 Next, a heating process fuses bonding metal to basic metal. Cooled, the double walls have become a strong, ductile tube, free from scale, held to close dimensions.

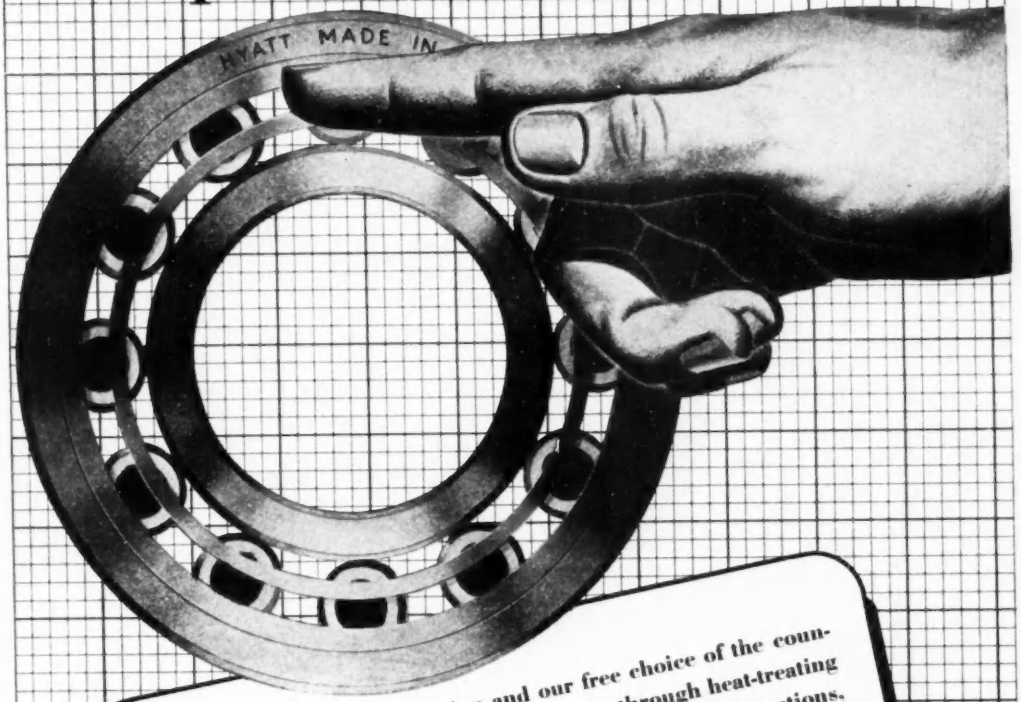
4 **Bundyweld** comes in standard sizes, up to ⅝" O.D., in steel (copper or tin coated), Monel or nickel. For tubing of other sizes or metals, call or write Bundy.

BUNDY TUBING DISTRIBUTORS AND REPRESENTATIVES

Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • ***Chattanooga 2, Tenn.:*** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. ***Chicago 32, Ill.:*** Lapham-Hickey Co., 3333 W. 47th Place • ***Elizabeth, New Jersey:*** A. B. Murray Co., Inc., Post Office Box 476 • ***Philadelphia 3, Penn.:*** Rutan & Co., 404 Architects Bldg. • ***San Francisco 10, Calif.:*** Pacific Metals Co., Ltd., 3100 19th St. • ***Seattle 4, Wash.:*** Eagle Metals Co., 3628 E. Marginal Way • ***Toronto 5, Ontario, Canada:*** Alloy Metal Sales, Ltd., 881 Bay St.

BUNDYWELD NICKEL AND MONEL TUBING IS SOLD BY DISTRIBUTORS OF NICKEL AND NICKEL ALLOYS IN PRINCIPAL CITIES

All Ways and Always Dependable...HYATT



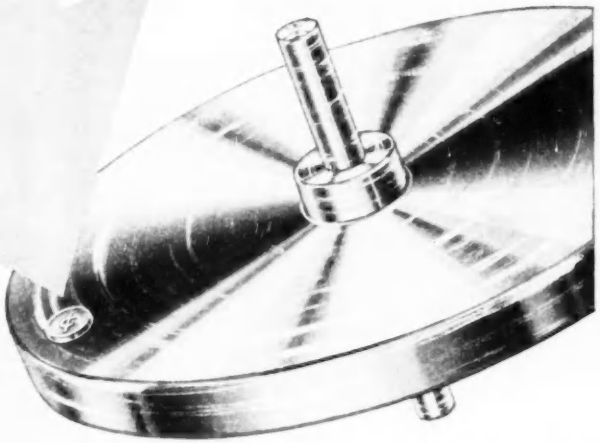
STARTING with correct design and our free choice of the country's finest steels from selected mills—on through heat-treating—hardening—grinding—assembly—process and final inspections, Hyatt Roller Bearings are made on a mass production quality basis that gives manufacturer, seller and buyer the maximum in dependable and accurate performance.

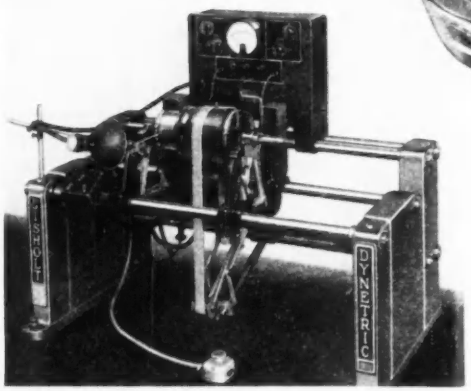
In the automotive field Hyatts, for more than half a century, have been and are daily demonstrating their superior quality in millions of cars, trucks and buses.

All adding up to making the name Hyatt a nationally known guide to dependable quality roller bearings. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey; Detroit, Michigan.

HYATT ROLLER BEARINGS

How to make a penny weigh 708 pounds!





The Gisholt DYNETRIC 3S Balancing Machine shown above is one of many sizes and types available to handle parts weighing from a fraction of an ounce to many tons. Write for literature on the complete line of "S" machines.

Yes, one of those little coppers in your pocket can exert enough "pull" to amaze you.

It's simple dynamics—centrifugal force. To start with, it weighs only ⅛ ounce. Put this "unbalance" weight on a rotating body at 6" from the center and let's see what happens. At 500 r.p.m. it exerts a force of .44 pound. Now, speed it up. The centrifugal force increases as the square of rotational speed. At 5,000 r.p.m. it becomes 44.25 pounds. At 20,000 r.p.m. the ⅛ ounce becomes a force of 708 pounds on the restraining bearings. Such unbalance in rotating parts causes vibration. And that means trouble in high-speed rotating assemblies—excessive wear, shorter life.

That's why it's so important to specify *accurate* static and dynamic balance in such parts—as a part of design. It's just as important as your specifications for materials and manufacturing tolerances.

World-wide leadership in the field of balancing makes Gisholt your most practical source for help on all balancing problems. Write us.

DYNETRIC BALANCERS — GISHOLT — DEVELOPED JOINTLY WITH WESTINGHOUSE ELECTRIC CORPORATION. "DYNETRIC" IS A TRADE MARK REG. U. S. PAT. OFFICE BY WESTINGHOUSE ELECTRIC CORPORATION

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Steering AT ITS BEST

BEAVER METROPOLITAN COACH, MODEL 35PT

ROSS BRINGS EASE . . . AND ECONOMY

COMPOSED of nationally known standard components, with an all-aluminum body, this new Beaver Metropolitan Coach, for city and suburban service, is attracting wide attention. Ross Cam and Lever Steering is one of the outstanding features. Emphasis has likewise been placed upon maintenance accessibility.

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

(1) ***Increased mechanical reduction*** . . . (2) ***More compactness*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency.***

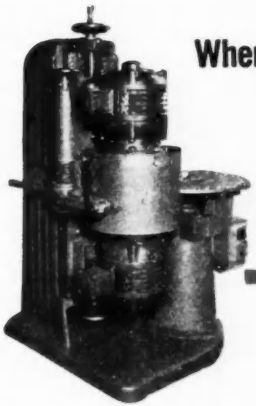
Throughout 42 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Ross

Cam & Lever ***STEERING***

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

When It's a Matter of Grinding Springs and Small Parts...



Only BESLY

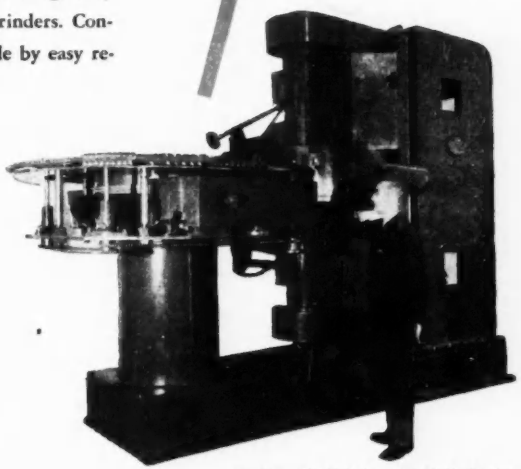
Offers This *Complete* Line of Production Grinders

No. 902 Besly Vertical Spindle Grinder for small coil springs, carbon brushes, ceramic parts, etc. Handles up to 4000 pieces per hour — $\frac{1}{8}$" to 1" O.D. and from $\frac{1}{4}$" to 4" long.

14 BASIC MODELS *Proved in Use*

Whatever the job specifications may be, there's sure to be a Besly Grinder that will do the work faster on closer tolerances —*with greater economy*. Sizes range from those that handle the smallest parts to large capacity units for grinding railroad car springs and similar large pieces. Fourteen different types are available to select from. Besly engineering adapts basic models to specific requirements of the user. Versatility in doing many grinding jobs well is characteristic of Besly Grinders. Conversion from one job to another is quickly made by easy replacement of the work holder.

Simplify production! Cut job costs! Talk over your requirements with a Besly engineer. Besly Grinders earn their way with savings of time, labor and material.



No. 926—53" Besly Double Spindle Vertical Grinder with power driven rotary fixture and multiple station feed wheel. Tooled for coil springs $\frac{3}{4}$" to 6" long—800 to 1500 per hour.

TITAN WHEELS

Write today for this helpful booklet which offers useful facts on abrasive wheels . . . It's free. Contains much valuable data on grinding wheels and abrasives. Learn how Besly-Titan Steelbacs cut "down time" and boost output.

Maybe GRINDING Is the Better Way . . . Better Check with

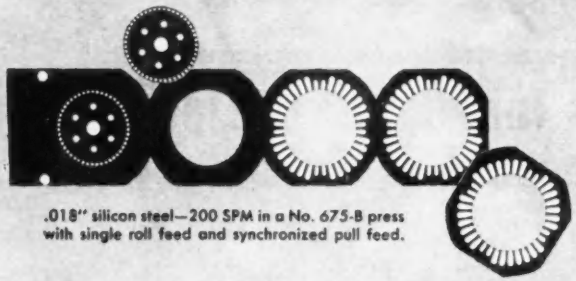
BESLY

BESLY GRINDERS AND ACCESSORIES
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS

CHARLES H. BESLY & COMPANY • 118-124 North Clinton Street, Chicago 6, Illinois
***Factory:* Beloit, Wisconsin**

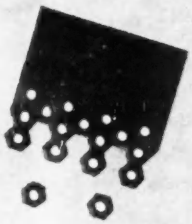
Why You Increase Output and Cut Costs

On *Bliss* High-Production Presses



.018" silicon steel—200 SPM in a No. 675-B press with single roll feed and synchronized pull feed.

.089" steel—165 SPM in a No. 675 press—two pieces per stroke.



.132" brass—300 SPM in a No. 630 press with single roll feed.

CHECK THESE FEATURES

Eliminate lost man-hours from intermediate handling between operations—Bliss High-Production Presses are specially engineered for Progressive and Compound Dies...increase output per man.

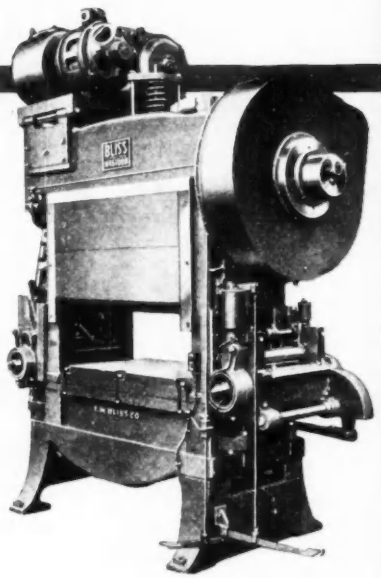
Minimize set-up time—all dies and adjustments are within easy reach of operator.

Control Speed and production ratio within the limit of tool and maintenance economy.

Step up operating pace with special feeds. Double roll or single roll feed can be mounted on right or left side of press.

Increase Die Life—slide alignment is maintained even under severe off-center loads through use of two connections and square gibbing...accurately finished.

Keep Down-time and Maintenance at a minimum—parts are easily accessible. Forced feed lubrication to all main bearings. Electric controls to supplement operator when press operates at high speed.



You don't have to speed up a Bliss High-Production Press until it cries "Uncle" to increase output and cut costs. In engineering it, Bliss didn't stop with increased strokes per minute but, what's more important, made possible higher ratio of productivity...greater press output. Some of the ways this is accomplished on Bliss High-Production Presses are enumerated in the above chart. Check your performance against it.

The accompanying examples show complex work achieved with one stroke, one press, one man. These are but a few of the stampings produced on Bliss High-Production Presses. You, too, can increase your output and reduce costs. Start by writing today for our catalog 27 - B.

E. W. BLISS COMPANY, TOLEDO 7, OHIO

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Salem, Ohio; Hastings, Mich.; Derby, England; St. Ouen sur Seine, France. SALES OFFICES AT: Detroit, Mich.; New York, Rochester, N. Y.; Cleveland, Toledo, Salem, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill.; New Haven, Conn.; Windsor, Ont.

MARQUETTE · BLISS · CONSOLIDATED · TOLEDO · DE LUXE

BLISS BUILT

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD

Hughes-Keenan Corporation Increases Truck Payloads 20% with J&L OTISCOLOY high-strength steel

J&L STEEL

(Above) *Spot-welding a truck roof-reinforcement and bow assembly, made of* J&L *Otiscoloy steel, at the Hughes-Keenan Corporation, Delaware, Ohio. Both the panel and bows are cold formed.* (Left) *Truck bodies on the Hughes-Keenan assembly line.*

Builds stronger, longer-lasting truck bodies with less steel

Eliminating 20% of the deadweight from milk truck bodies is not the only advantage in using J&L Otiscoloy high-strength steel, according to Hughes-Keenan Corporation, Delaware, Ohio.

For good sanitation, milk truck bodies must have their interiors steam-cleaned every day. Moisture from melting ice refrigeration during milk delivery is always present. Normally the continuous wetting and drying would cause rapid corrosion in a milk truck body made of mild steel.

Otiscoloy resists rust four to six times as effectively as mild steel. This pays off to the truck owner in longer service life. And it pays off to Hughes-Keenan Corporation in having a better quality, lighter, longer-lasting truck body.

The quality in these truck bodies does not entail added production costs. Although high-strength steel is more expensive than mild steel, Otiscoloy is used two gauges lighter with equal or greater strength than ordinary mild steel. Four sections can be made from Otiscoloy where only three sections of equivalent strength could be made from the same weight of mild steel. More units are produced per ton, freight costs are reduced, units are lighter, easier to handle during production.

Otiscoloy is recommended for applications where strength without bulky weight is desired—also where corrosion, abrasion and fatigue are problems in the service life of equipment.

Otiscoloy can be formed hot or cold, welded, forged, flame-cut and otherwise worked by standard methods. Here is a *modern* steel that is worth *your* investigation. Why not return the coupon to us today?

Jones & Laughlin Steel Corporation
430 Jones & Laughlin Building
Pittsburgh 19, Pa.

Please send me at once a copy of your booklet, "Otiscoloy High-Tensile Steel."

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

JONES & LAUGHLIN STEEL CORPORATION

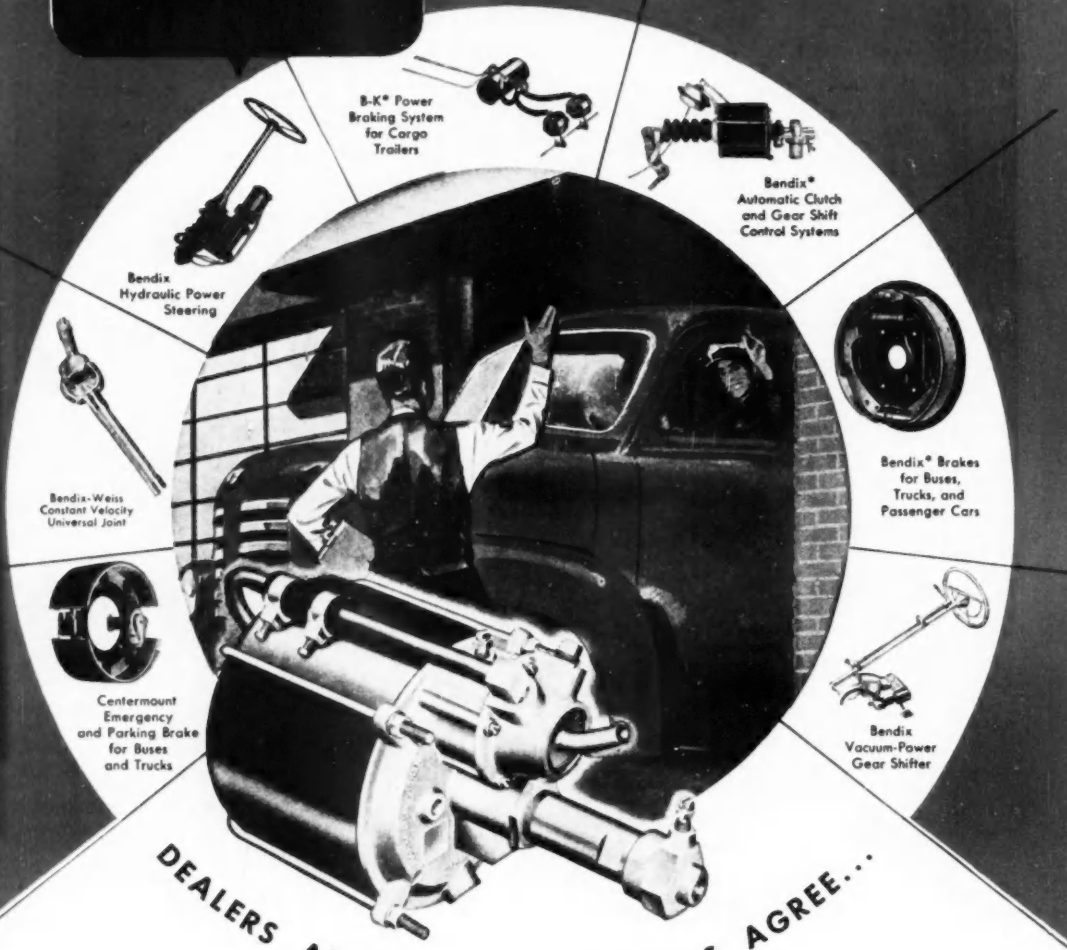
From its own raw materials, J&L *manufactures a full line of carbon steel products, as well as certain products in* OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Bendix Products

BUILDERS OF THE BASICS OF

BETTER MOTOR VEHICLES



DEALERS AND TRUCK OPERATORS AGREE...

HYDROVAC IS FIRST CHOICE!

Everything truck operators look for in power braking, they find in greater degree and for less cost in the Bendix Hydrovac*. It gives them easier, smoother, quicker stops with less physical effort. A record number of Hydrovac installations—over 2,000,000 at present—bears out this claim. Ask the man who uses Hydrovac about its performance . . . ask the man who services it about the upkeep . . . and you'll see why Hydrovac is first choice! This preference indicates the value of including Bendix Hydrovac power braking in your original equipment specifications.

*REG. U. S. PAT. OFF.

BENDIX PRODUCTS DIVISION of
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AUTOMOTIVE INDUSTRIES

The Authoritative Technical and News Magazine That Gives Comprehensive Coverage, Domestic and Foreign, of These Industries:

Passenger Car	Engine	Parts and Components
Truck	Body	Accessory
Bus	Trailer	Production Equipment
Aircraft	Road Machinery	Service Equipment
Tractor	Farm Machinery	Maintenance Equipment

High Spots of This Issue

Materials Handling Becomes of Age

Based on some of the practical applications of materials handling proved successful at Kaiser-Frazer's Willow Run plant, the author here analyzes qualifications of today's materials handling engineer in this exacting and ever expanding field. A first-hand report on his importance begins on page 26.

Automatic Transmissions—Part IV

P. M. Heldt gives extensive information on latest design and operation of the General Motors Hydra-Matic Transmission in this fourth installment of the series. Photographs, formulas, schematic drawings and diagrams further clarify the facts on this very fascinating subject. Page 28.

Quality Control Program at Reo

Use of a system of charts at each important station along assembly lines, as a basis for maintaining quality control, has resulted in some outstanding savings in costs at Reo Motors. The efficiency with which this system works, and with unruffling impact on worker morale, is revealed in the story found on page 32.

Machining Reo Gold Comet Engines—Part II

Sequel to Part I published in the August 15 issue of AUTOMOTIVE INDUSTRIES, Part II discusses operations on the piston, connecting rod, and crankshaft of the Reo Gold Comet Type OA valve-in-head engine. Part I had described major machining operations on the cylinder block and head. Concluding part starts on page 38.

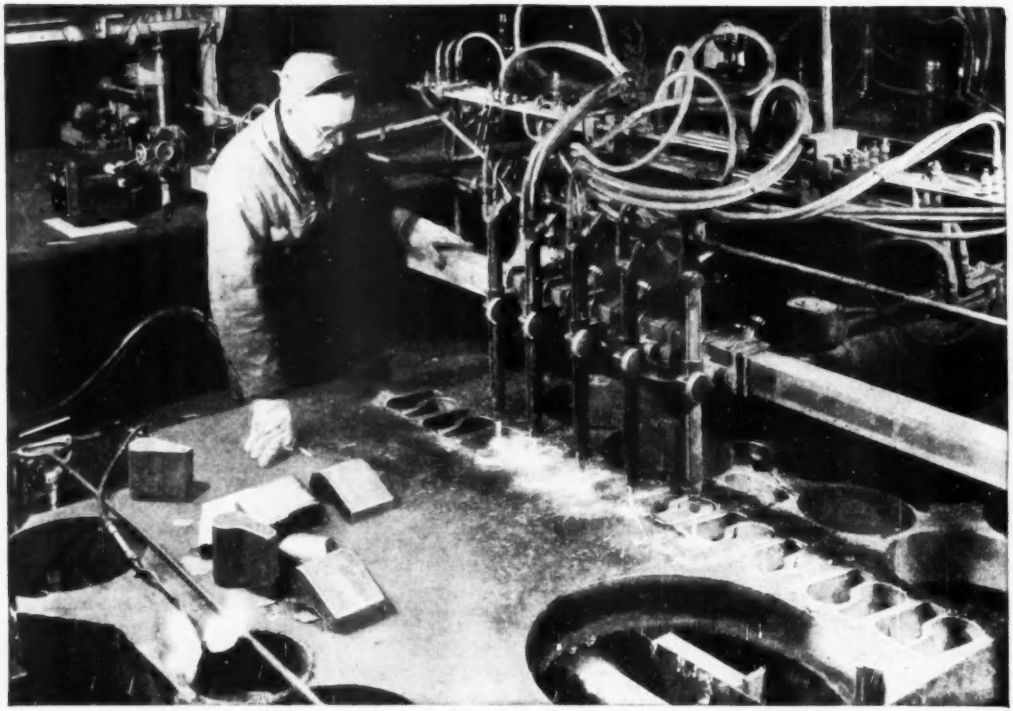
Huge Dynamometer Tests Heavy Duty Brakes

Bendix Brake laboratories of the Bendix Aviation Corp., South Bend, Ind., house what is said to be one of the largest machines in the world for testing automotive brakes. Story tells how this new equipment offers testing facilities for brakes of trucks and buses, off-the-highway vehicles, road graders, tractors, and heavy duty farm machinery. Page 43.

22 New Product Items And Other High Spots, Such As:

A discussion of the pension problem in connection with union demands; lowering costs by prefinishing bumper bars; the new Fiat Diesel engine; more information on the Chrysler disk brake; and the electro-magnetic transmission of planetary type developed by Clerk Projects in England.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3



The metal box, upper left behind operator, contains electronic tracing device which follows sketch and guides cutting torch.

New Electric Eye Machines Speed Ryerson Cutting Service

The multiple-torch gas cutting machine shown above is one of eleven recently installed in Ryerson plants from coast to coast. Equipped with an electronic eye tracing device, these remarkable new machines cut the most intricate shapes swiftly, accurately. Time spent in preparing wood and metal template making is eliminated. Instead the electric eye follows a simple sketch or blueprint within plus or minus fifteen-thousandths of an inch!

Many manufacturers are saving time and effecting substantial economies through the use of Ryerson flame-cutting. With electric eye machines rounding out a complete flame-cutting service, your Ryerson plant produces an endless variety of shapes from strong rolled steel. To mention only a few—circles, rings, wrenches, flanges, crankshafts, weldment parts, cams—many more. The result: clean, accurate edges whether mild steel, high carbon, alloy or stainless steel is used. And your Ryerson plant can produce hundreds of pieces to the same pattern with almost die-cut uniformity, from steel plate up to 15-in. thick.

The new Ryerson cutting machines illustrate how we are continually expanding our facilities to give you faster, more efficient steel service. The exact steel you need, cut or otherwise prepared to your particular specifications is delivered promptly when you draw on large, diversified Ryerson stocks.

PRINCIPAL PRODUCTS

BARS—Carbon & alloy, hot rolled & cold finished.
SHAFTING—Cold fin., ground & polished, etc.
STRUCTURALS—Channels, angles, beams, etc.
TUBING—Seamless & welded mechanical & boiler tubes.
STAINLESS—Allegheny bars, tubing, plates, sheets, etc.
PLATES—Sheared & U. M., Inland 4-Way Floor Plate.
SHEETS—Hot & cold rolled, many types.
MACHINERY & TOOLS—METAL WORKING EQUIPMENT

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 101, No. 6 **September 15, 1949**

Smaller Hudson Model Due by End of Year

The best information available indicates that both Nash and Hudson are definitely committed to the production of smaller cars. Various reports have labeled the new models as light cars, but only the Nash would appear to approach this category. The Hudson model will not be a light car in the generally accepted sense, but will be a smaller model than the company is now building with emphasis on economy of operation. The Nash will be powered by the present 600 engine with some possible modifications. As for timing, it looks as though the Hudson model will be out before the end of the year with the Nash coming along early in 1950. In both cases it is not expected that the cars will be lower in price than the Ford, Chevrolet and Plymouth.

Tucker Assets Down to $1,687,593

The current assets of the Tucker Corp. have been listed at $1,687,593 in a report by an accounting firm retained by trustees of the company under court approval. Cash on hand and in the banks is listed at $219,193 and government securities pledged as collateral for tax payments amount to $400,000. As of last March 3, when the present trustees were appointed by the Federal Court, assets totaled $7,323,283, or less than a third of the $25 million the company had in capital and other assets at one time. The report said that the status of distributor and dealer franchise notes held by the company and totaling more than $3.7 million is still in doubt.

K-F to Start Assembly on West Coast Soon

The Kaiser-Frazer Corp. will begin operations in its first assembly plant at Long Beach, Calif., on a limited scale sometime in October. K-F has owned the plant for more than two years and had originally planned to produce 300 cars a day there. However, under the current program of establishing smaller and more numerous assembly plants throughout the country, plans call for production of about 20 cars a day. All parts possible will be purchased from West Coast suppliers with the rest coming from Willow Run. Bodies-in-white will be shipped from the home assembly plant, but will be bonderized, painted, and trimmed at the Long Beach operation. At present there are no plans to ship basic body panels to the West Coast to be assembled into bodies there.

Year End Vehicle Registrations To Hit 43.5 Million

By the end of this year, motor vehicles in use in this country will total about 43.5 million, according to an estimate by the Automobile Manufacturers Association. The figure includes 35.4 million passenger cars, 7.9 million trucks, and more than 200,000 buses. The record breaking registration will total 2.5 million more than were registered last year and about 8.7 million more than in 1941. Travel by motor vehicles this year is also breaking all records with the total expected to reach 425 billion vehicle miles, or 25 billion more than in 1948 and 92 billion more than 1941.

Motor Vehicle Exports Continue to Skid

With a continuing decline in exports of motor vehicles from this country, cars and trucks sold abroad are at the lowest point since 1921 with the exception of the war years. For the first seven months of this year, exports amounted to only six per cent of total factory sales in cars and trucks, compared with about nine per cent for the same period last year. In July alone exports dropped to 3.7 per cent totaling only 21,470 vehicles which was the lowest monthly total since June, 1946. In 1940 and 1941 sales of American vehicles abroad amounted to only 4.6 and 4.7 per cent. Highest export sales of the industry were in 1927, 1928, 1929 and 1938 when they were about 13 per cent of factory sales.

FIRST WITH FOUR

The new 1949 Kaiser convertible, the only four-door convertible now on the market, has a rear window of transparent Vinylite which extends the full width of the automatic top and which folds into the roof stowage area when the top is down. The mechanical specifications of the four-door Kaiser deluxe sedan apply also to the convertible.

Monthly Vehicle Production Finally Passes 1929 Mark

It took 20 years and four months to do it, but the automobile industry finally surpassed the monthly production record set in April 1929. Production for August totaled 654,880 cars and trucks beating the previous record by nearly 33,000 units. The industry also set a record for the number of new passenger cars with 553,000, compared with 538,000 in April, 1929. An important fact to remember is that export sales accounted for about 13 per cent of the vehicles turned out in 1929, whereas today sales to overseas markets are very small—a scant 3 to 4 per cent—so that

BOOSTED TEN

Horsepower has been increased 10 per cent in this new 1950 Harley-Davidson Hydra-Glide motorcycle. An improved muffler is said to remove the staccato crack of the exhaust, leaving a deeper-toned sound. This motorcycle is equipped with a fixed carburetor jet with limited range adjustable high speed needle.

absorption of the record August total in the domestic market was very much higher both percentagewise and in total numbers.

The high monthly total for August brought the industry to within about 160,000 passenger cars of equaling the total production for all of last year, and that mark should be passed before the first of October if no unforeseen difficulties develop. Schedules for September have started out on the same high plane that prevailed in August, and in addition Willys, Nash and Kaiser-Frazer, out of production for the last 10 days of August, are again back in the running. Several companies hit all-time production records during August. Chevrolet, Oldsmobile, Buick, Pontiac and Cadillac racked up new records for monthly production, bringing the GM record to a new high of 291,383 cars and trucks. Chrysler Corp. also hit a new monthly total with about 137,000 units. Among the independents Packard made a new all-time record during the month with more than 15,000 cars, the highest month since April 1937. Ford had the highest month since the end of the war with 149,200 cars and trucks, but was far short of the 189,323 units the company built in August 1929, which, incidentally, is by far the best record ever accomplished for any single individual make of automobile. While sales continue at a record pace, current volume of production is resulting in larger field inventories and the outlook is for some reduction in output in the months ahead if the current seasonal decline sets in as has been expected. Another factor is the expected model changeovers to come this fall by most GM divisions and by Ford, although these will not be of long duration.

Ford to Face-Lift Models This Fall

Present plans of the Ford Motor Co. call for a face lifting model change this fall, possibly November and other modified styling revisions some time next year. However, the next major new model for Ford will probably not come until 1951.

Ford Paycheck Deductions To Replace Fund Drives

The Ford Motor Co. is the first automobile manufacturer to institute a program eliminating bothersome charitable fund drives among employes throughout the year. The company has established a new payroll deduction plan in its Detroit area plants under which employes may pledge a definite amount annually which will be deducted from their pay checks in weekly or monthly payments. The plan, which is entirely voluntary, will go into operation the first of next year with all funds collected turned over to a non-profit corporation organized to consolidate fund raising for health and community agencies.

Chrysler Names Colbert and Troost Vice Presidents

L. L. Colbert, president of Dodge Div., has been elected a vice president and director of the parent Chrysler Corp., bringing the number of directors to 21. George W. Troost, comptroller of the Corporation, has also been elected a vice president. Mr. Colbert joined Chrysler in 1933 as a member of the operations committee on the staff of K. T. Keller, president. He was made vice president of Dodge in March, 1935, and president in December of 1945. During the war he was general manager of the Dodge-Chicago plant.

Borg-Warner Sells Steel Plant

The Borg-Warner Corporation has sold its Superior Sheet Steel Div. plant near Canton, O., to the Louis Berkman Co. of Steubenville, O. Roy C. Ingersoll, president, Superior Sheet Steel Div., said that the mill has served B-W's objective in supplying steel during the shortage.

British to Study American Engine "Know How"

American methods and techniques used in manufacturing internal combustion engines will be studied by a British productivity team during a six-week visit to the United States. The 14-man group, composed of supervisors, technicians and workers from the industry in Great Britain, is scheduled to sail for the United States on Oct. 7. The visit has been arranged under the Economic

FAST MOVING FIAT

First shown on page 19, July 1, AUTOMOTIVE INDUSTRIES, a definitive model of the new Fiat Mille Miglie automobile, shown here, is now being produced. Priced at $4200, this car is powered by a four-cyl engine, and is said to have a speed of 100 mph.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Cooperation Administration's technical assistance program in cooperation with the Anglo-American Council on Productivity and the British Government. The British team is interested in visiting American plants manufacturing light and heavy Diesel engines and Diesel and gasoline air-cooled and liquid-cooled engines.

Revised Rent Factor Holds GM Wages Unchanged

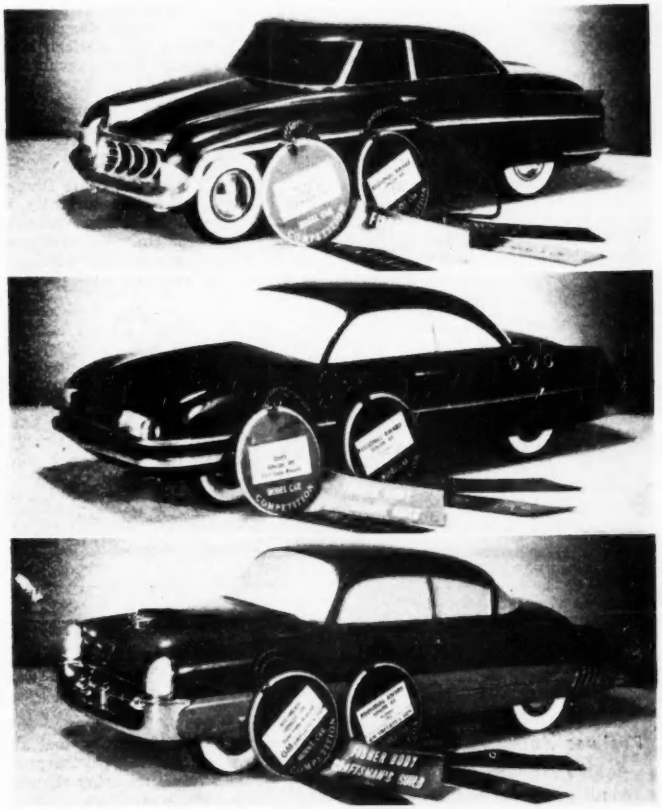
Because GM has voluntarily agreed to accept a higher rent factor than the one established by the Bureau of Labor Statistics, hourly rates will remain unchanged for the three months beginning Sept. 1. GM said that it would recognize an understatement of 0.8 in the Consumer Price Index, and when the adjustment is added to the July 15 BLS Index of 168.5, the revised figure does not represent enough movement to require any revision of hourly wages under the company's contract with the UAW-CIO. Under the sliding scale agreement, wages are geared to the Index and are reviewed every three months. A change of 1.14 in the Index is sufficient for an adjustment of one cent an hour. In addition an annual improvement factor is included which automatically gives the worker a three cents an hour raise once a year. Since the agreement went into effect, the workers received a three cent raise raise Sept. 1, 1948, a two cent cut Mar. 1 of this year, a three cent improvement factor raise June 1, and a one cent cut on June 1. The union has announced that it will attempt to throw out the cost-of-living wage agreement in its next wage contract negotiations with GM.

Twin Coach Gets Another Grumman Contract

Twin Coach Co.'s Buffalo Div. has received another big contract from the Grumman Aircraft Engineering Corp. This one is valued at $1.5 million and raises to $7 million the amount involved in subcontract that Grumman has farmed out to Twin Coach in Buffalo. The new contract is for spare parts to go along with the items ordered in the original production subcontract. Twin Coach is making the center panels, outer panels and control surface of new Grumman radar search and attack planes. The parts are so huge that Twin Coach had to build a couple of special truck-trailers to make deliveries to Grumman in Bethpage, N. Y.

Motorists Spent $14 Billion in 1948

The motoring public last year paid out approximately twice as much money for the purchase and operation of automobiles as it did in 1941, according to the latest Survey of Current Business published by the Commerce Dept. Expenditures in 1948 totaled $14,181,000 million, compared with $12,386,000 million in 1947. New and used car purchases last year accounted for $6,518,000 million; parts and accessories, $1,590,000 million; repairs and service, $1,320,000 million; gasoline and oil, $4,135,000 million; and $555 million for other miscellaneous expenses. AMA also has an interesting comment about the total paid out by motorists to city parking meters. It estimates that last year automobile users paid out $40 million for curb space. According to the AMA estimate, 700,000 meters were in operation in 2200 towns last year.



SHAPES OF CARS TO COME?

The first prize in the Junior Division (ages 12-15) of the Fisher Body Craftsman's Guild was awarded to William A. Ogram, Tallahassee, Fla., whose model is shown at the top. A duplicate first prize in the Senior Division (ages 16-19) was won by Howard Assel, Canton, O. (middle), and the first prize in the same division was awarded to Elia Russinaff, Detroit, Mich. (bottom).

Continental Develops Air-Cooled Diesel

An unique development in the internal combustion engine field is found in the announcement of two lightweight, opposed piston, air-cooled Diesel engines by Continental Motors Corp. Of overhead valve type, these engines feature the Lanova energy cell combustion system. Originally developed for the U. S.

Navy for compact portable generator sets, the engines have been released for commercial uses. The two-cyl engine is rated 9.75 bhp while the four-cyl model develops 25.14 bhp, continuous duty at full load.

Clark Equipment to Open $7 Million Gear Plant

The Clark Equipment Co. will begin operations soon in its large new automotive gear plant at Jackson, Mich. The plant will be opened with an open house for employes and representatives of civic organizations on Sept. 24. The total cost of the new unit, which is said to be one of the most modern gear processing plants in the world, is approximately $7 million, of which it is estimated more than $5 million is for the most up-to-date and efficient production equipment.

Bugas to Chairman Panel on Pensions

John S. Bugas, vice president and director of industrial relations, Ford Motor Co., and vice president in charge of the personnel division, American Management Association, will be the chairman of a panel on "Pensions and Other Issues in Collective Bargaining," on Sept 26, during the American Management Association's meetings in New York City, Sept. 26-28.

Use Stainless Steel Powder for Machine Parts

The Amplex Mfg. Co., Oilite Div., of the Chrysler Corp., is currently in mass production of finished machine parts made from stainless steel powders. A. J. Langhammer, president, says that the stainless steel parts do not contaminate metallically, and are very easy to clean. Because the parts being manufactured are being supplied under contract to government agencies, their nature is confidental and cannot be divulged.

Kaiser-Frazer Sells Two Steel Plants

The Kaiser-Frazer Corp. has sold its two subsidiary steel units—Phoenix Iron Works and Phoenix Bridge Corp. The two plants, closed since last March, were sold to the Barium Steel Corp. for more than $2 million.

GM to Expand Canadian Subsidiary

T. J. Cook, president and general manager of McKinnon Industries, Ltd., a subsidiary of G.M. in St. Catharines, Ont., Canada, announced that a contract has been let to construct an addition and make alterations to their present plant. The job, complete with tools, will cost more than $2 million and will employ an additional 350 to 400 workers. The project will add 70,000 sq ft of floor space. Construction will start immediately and is to be finished about Dec. 1 this year. Plans call for full production by Jan. 1, 1950.

CROWDS AND COUNTRY

This Berlin-built Gaubschat Bus-Train is designed for use in both cross-country travel and on crowded city streets. The first section seats 36 persons and has standing room for 10 more. and the second section seats 46 and also has standing room for 10, a total capacity of 102 passengers. It is powered by a six-cyl. 145-hp Diesel engine.

Postwar Automobile Owners Buying Half of New Cars

According to an analysis by the R. L. Polk & Co., owners of postwar cars are already purchasing nearly 50 per cent of new cars being sold although as a class they total only 27 per cent of the car-owning public. If the three lowest priced cars are eliminated, the figure is substantially more than 50 per cent. The Polk research indicates that one of every 3.4 owners of a 1946 car has purchased or will purchase a 1949 or 1950 model. One out of every four owners having 1947 cars will buy or plans to buy a new car and one of every seven owners having a 1948 model are already prospects for a new automobile. The findings indicate a very active market for new cars among owners of postwar vehicles, especially in the medium-priced group.

Salesmen Largest Buyers of K-F Utility Cars

In a survey covering purchasers of the first 10,000 utility cars offered by Kaiser-Frazer, the company found that salesmen and operators of small businesses account for 52 per cent of all sales. The second largest group of buyers are contractors and building trades workers such as carpenters, painters, and electricians with 20 per cent. Farmers are in third place with nine per cent, and professional persons such as architects and engineers are fourth with five per cent. The remaining 14 per cent is bought by non-occupational users such as housewives, retired persons and sportsmen who use the car strictly for personal transportation. At present about 40 per cent of K-F production is devoted to utility cars.

Continental Sales Chief to Supervise Advertising

The supervision of Continental Motor's Corp.'s advertising has been placed with C. Wheeler Johnson, vice-president in charge of distributor sales and service, C. J. Reese, president, has announced. The company's advertising

department is to be moved from its present location in Detroit to Mr. Johnson's headquarters in Muskegon, Mich., immediately, he said. This change in Continental's advertising set-up follows the resignation Sept. 1 of Nat W. Hopkins, who had been advertising director since 1945. Mr. Hopkins and Glenn H. Cummings, who has handled Continental's public relations for several years, have formed an advertising and public relations agency whose initial advertising accounts will include Continental Motors, Michigan Music Co., and Detroit Brickote, Inc.

Canadair to Build $2 Million Extension

H. Oliver West, president of Canadair, Ltd., has said that a $2 million extension will be built to the company's No. 1 plant at Cartierville, Canada, to manufacture 100 new F-86 jet fighter planes for the Canadian Government. Announcement of the agreement with Canadair was made at Ottawa by the Defense Department. Mr. West said that the extension will cover 200,000 sq ft.

May Reduce Car Height by Lowering Floor

Since the advent of much lower, wider automobiles as embodied in current styling, the big question has been in what direction could the industry go in further styling changes. The possible answer is indicated in the experimental work now underway by one company in making cars still lower by bringing the floor line down thus reducing overall height. Several models are now being tested. The lower floor height is obtained by rearranging the chassis elements under the floor so that the lower part of the body is much closer to the safe road clearance height than now.

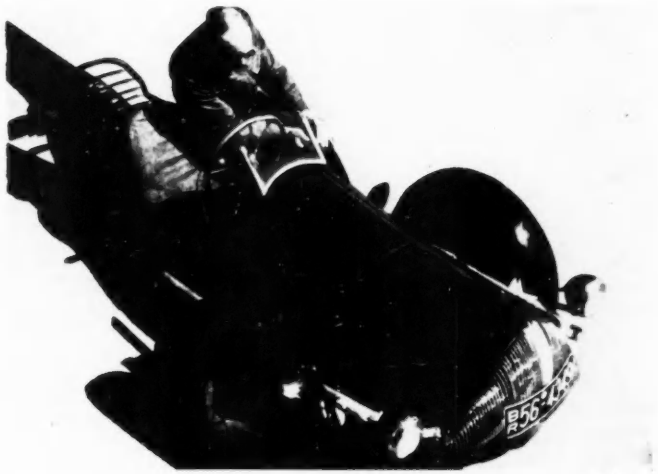
Acme

TWO IN ONE

Designed by Pellarini, an Italian engineer, this combination automobile-airplane is said to be capable of traveling on the highway at a speed of 60 mph, or flying 720 mi at 120 mph. Shown here with its wings folded ready for road travel, it will be displayed in major European cities.

Autoworkers Weekly Wages Hit High in July

Average weekly earnings of autoworkers rose to $68.90 in July, despite a general "leveling-off" in other industries, according to the Bureau of Labor Statistics. BLS compared the July average with the June median of $67.77 for the automobile industry, and said that the advance was significant. "Responding to record levels of output, weekly earnings for automobile parts and assembling establishments advanced to an all-time high in mid-July," BLS stated.



European

JUST FOR ONE

This small one-seater racing car was invented by Walter Wartenberg, a German automobile engineer. Featuring one rear wheel, and powered by a Volkswagen-Serien engine, this car is reported to have a speed of over 80 mph.

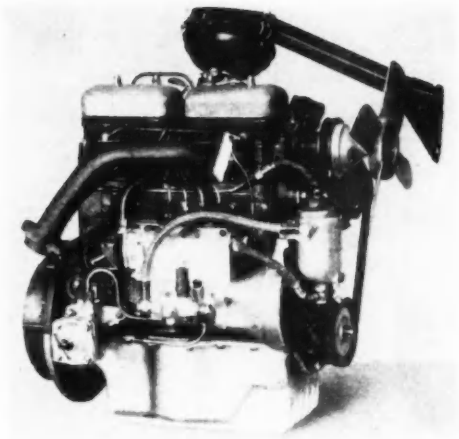
Cleveland Graphite Bronze Buys Monmouth Products

The Cleveland Graphite Bronze Co. has acquired the business and assets of the Monmouth Products Co., automotive parts manufacturer and distributor. Present personnel will be retained to conduct the business as the Monmouth Products Div. of Cleveland Graphite. The Monmouth line includes clutch plates and various clutch and chassis parts and engine bearings and bushings.

Goodyear Making Cold Rubber at Houston, Tex., Plant

Operated by the Goodyear Synthetic Rubber Corp., facilities for the yearly output of 30,000 long tons of "cold" synthetic rubber have gone into production at Houston, Tex., at a government-owned plant. The conversion of 24 of the plant's 48 reactors, and installation of refrigeration equipment,

NEWS *of the* AUTOMOTIVE INDUSTRIES



POWER FOR PASSENGERS

Described on page 26 of the August 1st issue of AUTOMOTIVE INDUSTRIES, this new Mercedes-Benz four-cyl Diesel engine for passenger cars develops 38-hp at 3200 rpm. A passenger car equipped with the new engine was shown at the West-German Export Fair in Hanover, Germany, recently.

was authorized by the Federal Government less than a year ago. The conversion places the local industry, a subsidiary of the Goodyear Tire & Rubber Co., among the leaders in the nation's "cold" rubber production picture. Before conversion started, the Houston plant had produced more than 600 million lb of conventional GR-S. The plant's remaining 24 reactors will continue production of this material, Goodyear has announced.

Horses Wild in Their Day— Killed More than Cars

The Automobile Manufacturers Association in its current issue of *Automobile Facts* comes up with figures to show that horsepower is safer under the hood of an automobile than it was in the old days in front of a buggy. It quotes a National Safety Council report showing 3850 deaths in accidents involving horses and horse drawn vehicles in 1909, or 30 fatilities per 100 million horse-travel miles. The current motor vehicle fatality rate is seven deaths for each 100 million miles of vehicle travel.

New GM Transmission Has Smoother Shift

A little further information on the new GM transmission under development indicates that it irons out the "bumps" between gear changes that are evident in the present Hydra-Matic unit. It combines the best features of the Hydra-Matic and a torque converter to give much smoother operation while retaining the advantages of gear trains for faster acceleration.

Tool Engineers to Meet in Montreal

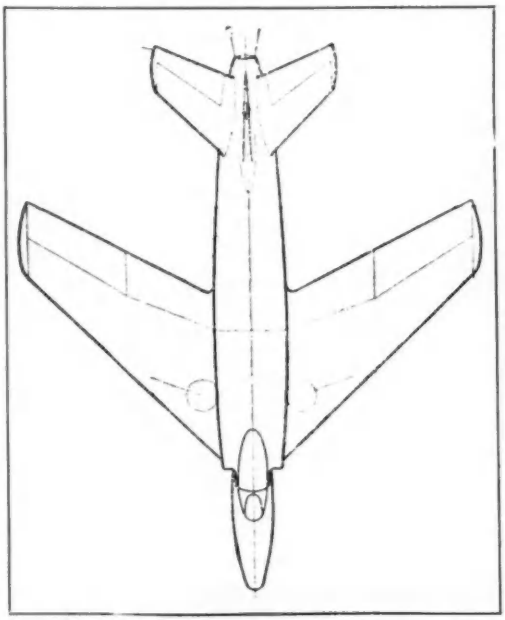
To be held in Montreal, Canada, from Oct. 27-29, the 17th semi-annual meeting of the American Society of Tool Engineers will include nine technical sessions. The majority of the sessions will deal primarily with methods by which tool engineers can reduce costs.

Auto-Lite Completes New Plant on West Coast

Construction of a modern automobile battery plant has been completed by the Electric Auto-Lite Co., of Toledo, O., at Paramount, Calif., southeast of Los Angeles. Manufacturing is expected to start in mid-September. The new plant is Auto-Lite's largest west of Chicago, and its second on the Pacific Coast. Production is geared to 3000 batteries a day, with employment of between 150 and 200 persons. P. F. Brown, vice-president in charge of the company's Oakland plant, will also manage the new factory. W. A. Zolg will be plant superintendent.

Gage Industry Receives Large Standby Order

Twelve gage manufacturers have been assigned standby schedules for the production of more than $20 million worth of production gages by the National Security Resources Board. The standby contracts are part of the overall military preparedness program, and are designed to speed immediate production of necessary items in case of a military emergency. Three Detroit companies included among contract recipients are Vinco Corp., Lincoln Park Industries, and Detroit Tap & Tool Co.



SWEPTBACK SUPERMARINE

Powered by a Rolls-Royce Nene turbo-jet engine, the Supermarine 510, experimental fighter, developed by Vickers - Armstrongs Ltd., England, has a span of 31 ft. 8½ in. It is sweptback approximately 42 deg.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Willys Gets $1.3 Million Order From Turkey

Willys-Overland Motors, Inc., has received an order amounting to more than $1,355,000 from the Turkish government for Jeeps, four-wheel drive trucks, station wagons, and spare parts. Willys also received an order for 50 station wagons amounting to $74,936 from the government of Greece.

CWC Installs Giant Air Compressors

The Campbell, Wyant & Cannon Foundry Co. at Muskegon, Mich., has installed two new large air compressors to replace several smaller units. The largest of the new compressors has a capacity of 5400 cu in. per minute and is powered by a 1000-hp synchronous electric motor which automatically adapts itself to whatever load is demanded. It is equipped with pistons 30-in. long and 18-in. in diameter and has a 21-in. stroke. Purchase and installation cost of the unit was nearly $100,000.

V-6 Engine Development Makes Good Progress

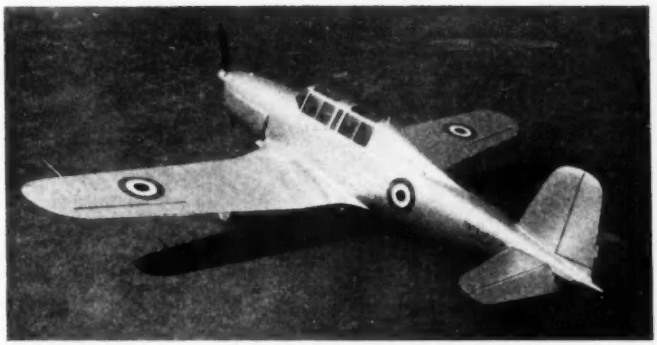
A V-6 engine, now under test by one of the larger producers, is a definite possibility as a passenger car power plant in a year or two. The engine has overhead valves.

Name Chaille Manager of Fruehauf's Western Div.

L. H. Chaille has been appointed regional manager of the Western Division, Fruehauf Trailer Co. Prior to his appointment, Mr. Chaille held the position of director of public relations. In his new job he will have supervision and administration of the company's 16 factory branches in the western division.

Ship 295 Personal Planes In July

The shipment of 295 personal aircraft by 10 companies during July has been announced by the Personal Aircraft Council, Aircraft Industries Association of America. The shipments included 226 four-place planes, 60 two-place aircraft, and 9 one-place, with a total dollar value of $1,154,000 figured at the manufacturers' net billing price. Shipments by 11 companies the previous month totaled 424 valued at $1,628,000. July shipments bring the 1949 totals to date to 2376 aircraft valued at $9,955,000.



METAL RACER

This postwar two-place Fiat "G. 46" all-metal racing monoplane is a derivation of war planes constructed in the "Fiat-Aeronautica d'Italia" factory. While maintaining the same form and construction, the wing area has been reduced to 172 sq ft instead of 227 sq ft. In the place of a liquid-cooled engine, an air-cooled engine is used.

GM Has Big Automobile Show At Michigan State Fair

Approaching in scope the big Transportation Unlimited presentations of GM in New York and Detroit earlier this year, a full-sized automobile show was put on by GM at the Michigan State Fair, Sept. 2-11. Many of the features of the earlier shows were included, aside from cars themselves, such as the Crossroads of America diorama, and special new scientific demonstrations later to be placed in GM's traveling stage shows, Previews of Progress. The GM show covered two large plots at the fair. Chevrolet occupied the building it constructed some time ago, and adjoining to the west was the big GM show tent, 152 ft by 80 ft, where the special attractions were housed. In the open, between the two structures, was a truck and coach exhibit. A dozen GM automobiles were inside the big tent, and 13 more on the broad black-top surface outside. An Allison jet aircraft engine, the Oldsmobile engine exhibit, one on the evolution of the Fisher Body, and a Pontiac chassis, were inside.

Bingham-Herbrand Get Assets of Superior Manufacturing

The assets of Superior Manufacturing of Cleveland have been acquired by the Bingham-Herbrand Corp. of Toledo and Fremont, O., and will operate in the future as a part of the Herbrand Div. Mr. J. E. Terry, who has been associated with Superior since its founding in 1932, will carry on as general manager of Superior Manufacturing. Superior's line is being improved and enlarged, and announcement of new tools will be made soon.

Thermoid Produces New Brake Film

The Thermoid Co. has produced a training film on brakes called "The Safest Thing On Wheels," which carefully covers each of the factors that control brake performance: the hydraulic system, drum condition, the selection and precision application of brake lining, and accurate adjustment of all types of hydraulic brakes.

French Close Aviation Plant

The ex-Lorraine Dietrich aviation engine factory in the suburbs of Paris, which came under State control under the 1936 nationalization scheme, has been closed by Government order, thus throwing 3500 employees out of work. It was while the staff was on a paid vacation that troops were ordered into the factory and measures taken to prevent the men taking possession on their return. All workers were given an indemnity. Altogether 6000 persons have been thrown out of work in the Paris region by reason of the de-nationalization program. A six-year plan for the aeronautical industry will be submitted to Parliament soon. It will undoubtedly recommend a very consid-

(*Turn to page 100, please*)

A Discussion of the

Pension Problem

in Connection with Current Union Demands

By Enders M. Voorhees,
Chairman of Finance Committee,
United States Steel Corp.

PENSIONS deal with people's whole life spans. They involve the voluntary or compulsory shifting away from people's immediate reach of substantial parts of the values they currently produce so that those values will be available to sustain later consumption by them when their own production has ceased. Pensions can take from people jurisdiction over their own thrift and savings and subject them to unwanted mass disciplines. Production policies and other problems are also involved, as the health and medical care of the American people has lengthened the span of productive years beyond that formerly dreamed possible.

If a business is to pay pensions to people who are not working, as well as wages to people who are working, then it must pay less to those working in order to find funds to pay those who are not. This is true in everyday life: The man who would spend on Sundays when he is not producing must spend less than he earns on weekdays when he is producing. Everybody cannot consume during the week all that is then produced and still do any consuming on Sunday—for there is nothing left to consume. Pensioners as non-producers cannot consume except as they share what producers turn out.

In the final analysis no significant source other than current payments for employe services performed is generally available to the nation to be tapped for wage earners' pensions. No business can force government to reduce total taxes, or can force suppliers of tools and materials to charge less. In fact, if such suppliers be also loaded with fixed pension payments to non-producing people their prices would advance, even as taxes do to cover payments to non-producers. Other than payments to wage earners, there then remain only dividends and income reinvested. But a corporation without dividends or prospects thereof will either die or never be born in the first place. As for income reinvested, that, in most cases, and certainly in ours, is as much already spent for wages, tools and materials as the cost items so labeled on the income statement. These items are, moreover, small in comparison with wages and pension demands.

Corporations continue to exist only because of the dividend and income reinvested possibilities. Eliminate those possibilities and new businesses will remain unborn, while expansion by existing concerns will be replaced by contraction. Those newly entering the nation's labor force will find difficulty in locating a job, and the number of those presently employed will diminish.

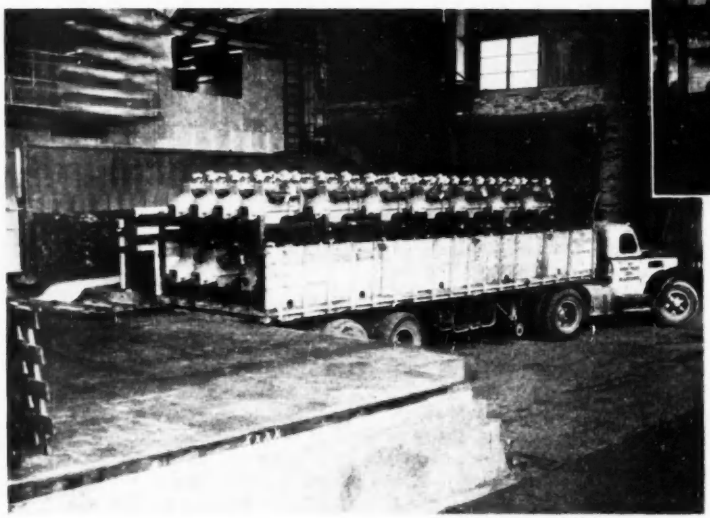
With pronounced unemployment and men looking for jobs, then either wage rates will go down to make room for the pension costs or the government will issue what amounts to printing press money to take care of the unemployed. Then prices in general will rise, cutting back the buying power of the wage dollar to accommodate in terms of real things the pension cost imposed. These are the inescapable consequences of the general assumption by employers of responsibility for paying money to people not producing. Some few concerns may be able to find room for modest pensions not deducted from wages and still escape too great competitive deterioration or insolvency.

The question then is not whether old folks need income, for no one questions that. For a couple of centuries the old folks in America have pretty well been able out of their own prior foresight, thrift, productivity and self reliance to provide for their final years of consecutive Sundays. There is no significant class of both destitute and aged in America. Nor is the question even that of who is to provide that income. It will always be the same people—only those producing can provide, through voluntary or enforced

(*Turn to page* 96, *please*)

Materials Handling Becomes of Age

By O. E. Johnson,
Staff Assistant to Vice-President in Charge of Manufacturing, Kaiser-Frazer Corp.



This shipment of engines has been efficiently palletized, and there is sufficient dock space for fork truck unloading.

IT seems that colleges and universities are missing a bet in not providing adequate courses for the training of materials handling engineers. To my knowledge, there is no higher educational institution offering such a course as a full time study. There is nowhere that a young man may go for a B.S. degree in materials handling; the best he can do is to attend evening classes (at some schools) in packaging engineering, which is but one phase of materials handling engineering.

The duties and qualifications of a materials handling engineer are many and varied. This was emphasized during World War II, when industry was forced to concentrate on ways and means of transporting, warehousing and shipping materials so that they could be handled quickly and efficiently—mechanically, rather than manually. Much of the success of the Normandy invasion, according to General Eisenhower, was due directly to our ability to handle materials and men fast.

Until our institutions of higher learning assume the function of turning out ready-made material handlers and while it is industry's job to fashion its own, it might be well to examine the type of person who will be most likely to succeed in this exacting field.

1. He should be a man with engineering background, either through schooling or experience, or both.

2. He must be a man who has proved his desire to be of service and must be naturally cooperative.

3. He must have a pleasing personality, yet be firm in his convictions, for one of his principal jobs is that of coordination, particularly that of coordinating men and equipment. He must be able to get along well with labor, especially with the men in his own department.

4. He must have ability to organize and train men—the knack of picking the right man for the job.

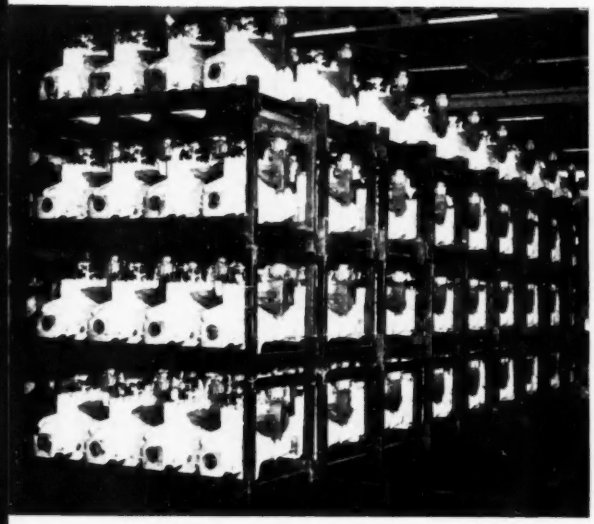
5. He must be neat and orderly in his conduct and thinking, and must train himself and his men to have a place for everything and everything in its place.

6. The materials handling engineer must be economical and aggressive in his thinking and planning, persistent in ever improving procedures, never satisfied that his service to manufacturing is complete.

Now, having touched upon the qualifications of the materials handling engineer, let us consider his duties. In somewhat the following order, he must:

1. Assume complete responsibility for the flow and storage of productive materials so that manufacturing need not worry about it.

2. Accept responsibility for helping to keep the plan



The materials handling engineer sees to it that stores are kept neatly and easily accessible.

clean. To accomplish this, he must insist on plant engineering maintaining well painted aisle marks and must school his organization to keep materials flowing between them.

3. Be in constant contact with plant engineering and be prepared to fight for plant layout changes necessary for efficient, economical materials handling. Under ideal circumstances, he relieves manufacturing and plant engineering of those responsibilities.

4. Take responsibility for providing modern handling and transportation equipment in quantities when and where needed, and be able to demonstrate to management the savings resulting from such equipment in order to obtain appropriation approval.

5. Unload and load cars and trucks mechanically, quickly and economically.

6. See to it that receiving reports are written promptly so that accounts payable need not conflict with discounting invoices, and production planning may know at a glance precisely what has been received and what is receivable or en route.

7. See to it that shipments are made promptly, packaged most economically, and that shipping papers are forwarded promptly.

8. Have his packaging engineers work with vendors to accomplish unit loads that can be handled mechanically, thus assisting the purchasing department in bringing the unit price down by not having to pay for wasted labor.

9. Arrange with plant engineering for preventive maintenance of plant and highway trucks and all material handling equipment.

From the foregoing, it is apparent that the qualifications of a materials handling engineer are many, that the job is exacting and vital.

Practical Applications of Material Handling

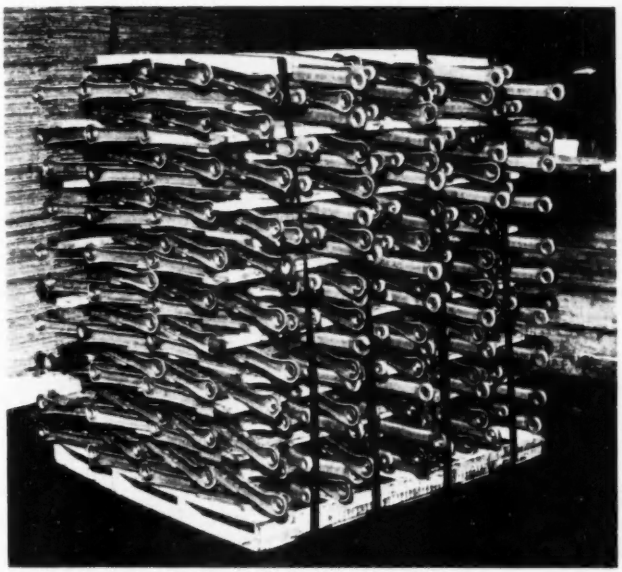
Following are some practical applications of material handling that have proved successful at the Kaiser-Frazer Willow Run operations, and which may be applicable anywhere in whole or in part.

Unloading Box Cars

Through the traffic department, cars are spotted nearest to the point of storage or use. Sufficient dock space is provided for fork truck unloading and the unloading platform is level with the car door.

Once the car is ready for unloading, the materials handling engineer acquaints the packaging engineer with unloading problems and arranges for palletizing

(*Turn to page 88, please*)



Suspension arms are easily handled when palletized as shown in the illustration.

Automatic Transmissions

GENERAL Motors' Hydra-Matic transmission is a four-speed-and-reverse planetary transmission controlled automatically by hydraulic means and combined with a fluid coupling. It comprises three planetary assemblies of the internal-gear type, referred to, respectively, as the front unit, the rear unit, and the reverse unit. The rear unit is so designed that it gives the proper reduction ratio for second speed, while the front unit gives the third speed. In first speed the power is transmitted through the front and rear units in succession, both acting as speed reducers, and the first-speed ratio therefore is equal to the product of the ratios for second and third speeds. In fourth speed both units are locked, and the drive is direct from the input to the output shaft.

The general arrangement of the internal-gear type of planetary assembly is well known, at least to the older generation of automobile engineers, as such units were extensively used in transmissions during the pioneer days of the industry. The assembly consists of a sun gear, a ring gear concentric therewith, and a number of planet gears or pinions which are in mesh with both the sun gear and the ring gear. The planet gears are supported by a rotatable planet carrier. To effect a speed reduction for forward drive, either the sun gear or the ring gear is anchored or held from rotation by a friction band, power is applied to the gear which is not anchored and the planet carrier serves as the driven member. If the sun gear has the power applied to it the reduction ratio is

$$\frac{\text{Number of ring-gear teeth}}{\text{Number of sun-gear teeth}} + 1$$

while if the ring gear is the driving member the reduction ratio is

$$\frac{\text{Number of sun-gear teeth}}{\text{Number of ring-gear teeth}} + 1.$$

The reason for the choice of planetary instead of conventional gears for the Hydra-Matic transmission undoubtedly was that with the former the problem of clashing gears or positive-clutch members does not arise, each speed being engaged by an individual friction member which takes hold more or less gradually. For direct drive through the assembly the various members are locked together by means of friction clutches of the multiple-disc type.

A longitudinal section through the Hydra-Matic transmission is shown in Fig. 1. First on the left can be seen the hydraulic coupling, which is enclosed in a housing consisting of the engine flywheel and a part known as the torus cover. Engine power is transmitted through this housing to the ring gear of the front planetary unit. When the sun gear is held from rotation by the friction band, the planet carrier turns in the forward direction—the same direction as the crankshaft—at reduced speed, and drives the impeller of the fluid coupling, which is fastened to the same tubular shaft as the carrier. The runner of the coupling is secured to the central, solid shaft, which also carries the sun gear of the rear unit. When the ring gear of the latter unit is held from rotation by its friction band, the planet carrier of the unit, which is integral with the output shaft, is caused to rotate in the forward direction at a still lower speed than the sun gear. Thus for first speed the friction bands of both units are applied.

For second speed the ring gear of the rear unit is held from rotation, while the friction band of the front unit is freed and the members of this unit are locked together by its friction clutch. For third speed the friction band of the rear unit is released and that unit is locked by its friction clutch, while the friction band of the front unit is applied and holds the sun gear of that unit from rotation. For fourth speed or direct drive the friction bands of both units are released and the friction clutches of both engaged.

The reversing mechanism of the Hydra-Matic is

PART IV—Latest Design and Operation of the General Motors Hydra-Matic Transmission. Part III of This Series on Modern Automatic Transmissions Was Published in the June 15 Issue of AUTOMOTIVE INDUSTRIES.

By P. M. Heldt

quite unique. While the rearmost of the three planetary units is referred to as the reverse unit, when the car is being backed all three of the units are under load, and the motion actually is reversed in the so-called rear unit, which serves primarily as a speed-reducing member for first and second speeds, though, of course, the reverse unit also plays its part in producing the reverse motion.

It may be of interest to explain the action of the various units during reverse motion in some detail. Let a_1, a_2 and a_3 represent the numbers of teeth in the sun gears of the front, rear, and reverse gears, respectively; and d_1, d_2, and d_3, the numbers of teeth in the ring gears of the three units. The planet carriers may be designated by c_1, c_2, and c_3. Fig. 2 is a diagram of the rear and reverse planetary units, the right half representing the reverse and the left half the rear unit. From the sectional view, Fig. 1, it can be seen that the planet carriers c_2 and c_3 of the rear and reverse units are both solid with the output shaft.

Now assume that the output shaft (and, therefore, c_3) makes one left-hand (reverse) revolution, looked at from the front. When the transmission is in reverse, ring gear d_3 is anchored, and in accordance with the rule for internal-gear planetary units in which the sun gear is the driving member, a_3 will make $(d_3/a_3) + 1$ left-hand revolutions while the output shaft makes one such revolution. Sun gear a_3 of the reverse unit is in direct driving connection with ring gear d_2 of the rear unit (see Fig. 1), while planet carrier c_3 is in direct driving connection with carrier c_2, both carriers being fast on the output shaft. Therefore, ring gear d_2 will turn at the same speed as sun gear a_3 and will make $(d_3/a_3) + 1$ left-hand revolutions, while planet carrier c_2 will turn at the same speed as carrier c_3 and will make one left-hand revolution. Thus when the transmission is in reverse, both the ring gear and the planet carrier of the rear unit revolve, and this implies that the sun gear of that unit also revolves. In reverse, therefore, the friction band of the rear unit is released, and since the various members of this unit turn at different speeds, the friction clutch is disengaged.

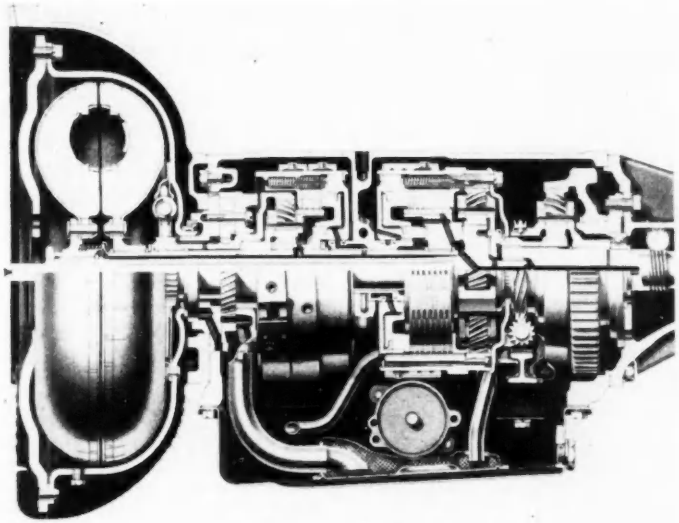


Fig. 1—Axial section of Hydra-Matic transmission.

We already have the numbers (and direction) of revolutions of the ring gear and planet carrier of the rear unit corresponding to one reverse revolution of the output shaft, and it now becomes necessary to determine the resulting number (and direction) of revolutions of the sun gear of that unit. To do this we first assume the planet carrier to be anchored and the ring gear to go through its calculated motion; then assume the ring gear to be anchored

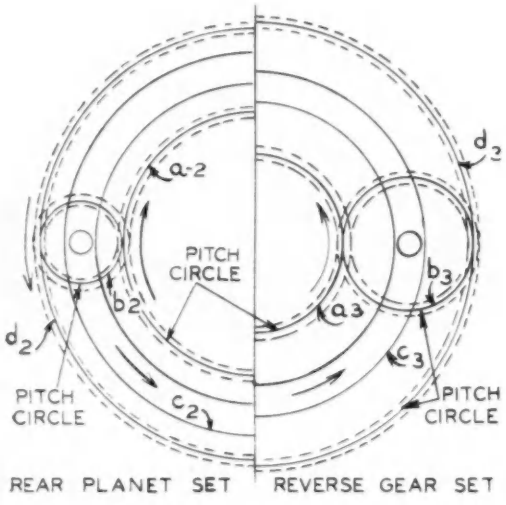


Fig. 2—Diagram of the rear and reverse planetary assemblies

and the planet carrier to go through its motion. In each case we determine the resulting number and direction of revolutions of the sun gear, and finally we add these two motions algebraically, to obtain the actual motion of the rear-unit sun gear corresponding to one reverse revolution of the output shaft.

It is obvious that if planet carrier c_2 is stationary, left-hand or reverse rotation of ring gear d_2 will produce right-hand rotation of sun gear a_2. The latter will turn faster than the ring gear in the proportion of the number of ring-gear teeth to the number of sun-gear teeth. Since the ring gear makes $(d_3/a_3) + 1$ left-hand revolutions, the sun gear will make

$$\left(\frac{d_3}{a_3} + 1\right) \times \frac{d_2}{a_2} = \frac{d_3\, d_2}{a_3\, a_2} + \frac{d_2}{a_2}$$

right-hand revolutions.

When the ring gear of the rear unit is locked and the planet carrier of the latter makes its one left-hand revolution with the output shaft, the sun gear, in accordance with the rule for internal-gear planetary assemblies cited above, makes $(d_2/a_2) + 1$ left-hand revolutions. The motion imparted to the sun gear by the ring gear when the planet carrier is anchored is always greater than that imparted to it by the planet carrier when the ring gear is anchored, and the actual motion of the sun gear therefore is right-handed and equal numerically to the difference between the two values, viz.,

$$\left(\frac{d_3\, d_2}{a_3\, a_2} + \frac{d_2}{a_2}\right) - \left(\frac{d_2}{a_2} + 1\right) = \frac{d_3\, d_2}{a_3\, a_2} - 1.$$

When the power reaches sun gear a_2 its speed factor already has been reduced by the forward unit in the proportion of $(a_1/d_1) + 1$. Thus the total reduction in reverse is

$$\left(\frac{d_3\, d_2}{a_3\, a_2} - 1\right) \times \left(\frac{a_1}{d_1} + 1\right) = \frac{d_3\, d_2\, a_1}{a_3\, a_2\, d_1} + \frac{d_3\, d_2}{a_3\, a_2} - \frac{a_1}{d_1} - 1.$$

The sun and ring gears of the Hydra-Matic have the following numbers of teeth—

$a_1 = 27$	$d_1 = 60$
$a_2 = 41$	$d_2 = 67$
$a_3 = 28$	$d_3 = 68$

the reduction ratio in reverse will be

$$\frac{68 \times 67 \times 27}{28 \times 41 \times 60} + \frac{68 \times 67}{28 \times 41} - \frac{27}{60} - 1$$
$$= 1.785 + 3.968 - 0.45 - 1 = 4.304$$

Actually the ratio of speed reduction between flywheel and output shaft would be slightly greater, on account of the slip in the hydraulic coupling.

Some rather unusual effects result from the way the hydraulic coupling is incorporated in the line of transmission. We usually think of such a coupling as being combined with the engine, its impeller turning at crankshaft speed. That is the way the coupling acts in the Hydra-Matic when the latter is in either second or fourth speed, when the front planetary unit is locked. But when this unit operates to give a speed reduction, in first and third speeds, the coupling impeller is driven through this reducing gear and turns

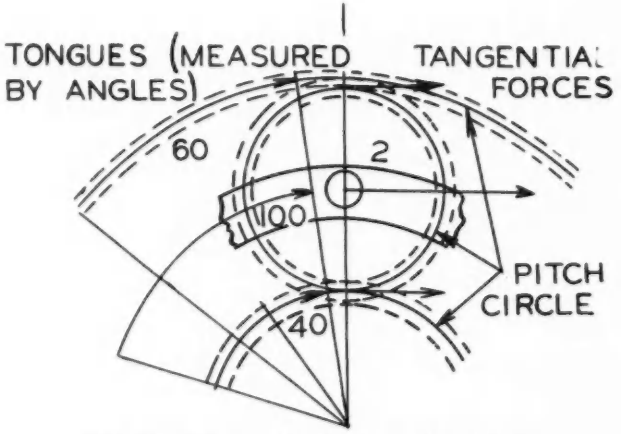


Fig. 3—Force and torque diagram for rear unit in forward drive

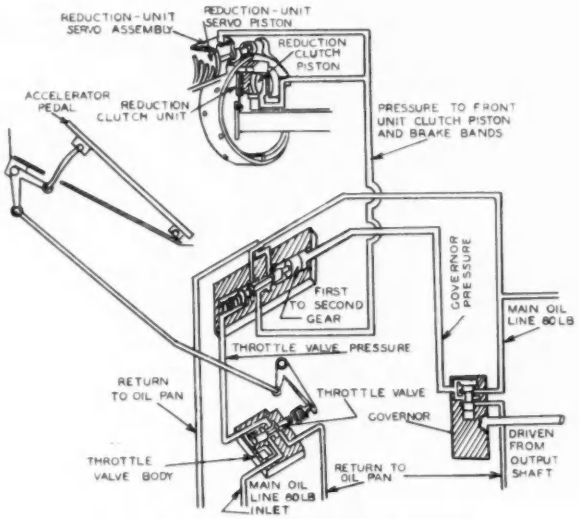


Fig. 4—Schematic diagram of hydraulic control system

at a considerably lower speed than the crankshaft. This is of importance when the engine is being idled with the transmission in the "Dr" position, or in first speed. A hydraulic coupling always produces a certain drag when the engine idles—unless there is a friction clutch which entirely disconnects the engine — and this tends to cause the car to "creep." The drag (or torque) varies as the square of the impeller speed, and since the impeller under the conditions mentioned turns at only about 70 per cent crankshaft speed, the drag produced is only about one-half what it would be if the impeller of a similar coupling were mounted directly on the crankshaft.

This reduction in the torque transmitted by the coupling while the transmission is in first speed, due to the reduced impeller speed, is not restricted to idling conditions but continues as long as the transmission is in first speed. The result is that for a given torque transmitted the slip in the coupling will be greater than if the impeller turned at crankshaft speed. Since the first speed is used only for short periods while the car is being accelerated, this is of no particular importance. The impeller of the coupling runs at reduced speed also when the transmission is in third speed, and there a higher percentage of slip (and of consequent power loss) would be more serious, since this speed is used much more than the first. The situation is saved by the fact that in third (and also in fourth) speed the coupling needs to transmit less than half of the output torque, which it can develop with a small percentage of slip. The output shaft is driven by the planet carrier of the rear unit. The planet gears of this unit serve as balancing levers, equal tooth pressures being exerted on them by the ring gear and the sun gear, of which the former is driven by direct mechanical connection from the crankshaft, while the latter is driven through the hydraulic coupling. But while the pitchline loads on the sun gear and ring gear are equal, the torque on the latter is roughly one-and-one-half times as great as that on the former, since its pitch radius is proportionately larger. As indicated in Fig. 3, this makes the sun-gear torque (and, therefore, that of the coupling) roughly 38 per cent that of the total, and the coupling can transmit this with less slip than it could transmit the whole of the torque at crankshaft speed.

Upshifts as well as downshifts are effected automatically by means of hydraulic pressure which acts on four control units, viz., the friction band and clutch of the front unit, and the friction band and clutch of the rear unit. The positions of these four control units for the four forward speeds are given in the following table:

	Front Unit		Rear Unit	
	Band	Clutch	Band	Clutch
First speed	on	out	on	out
Second speed	off	in	on	out
Third speed	on	out	off	in
Fourth speed	off	in	off	in

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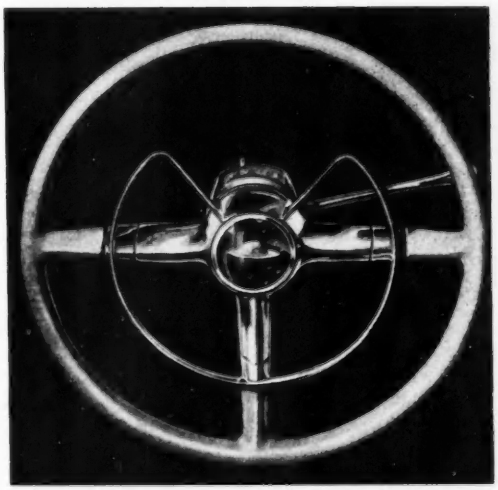
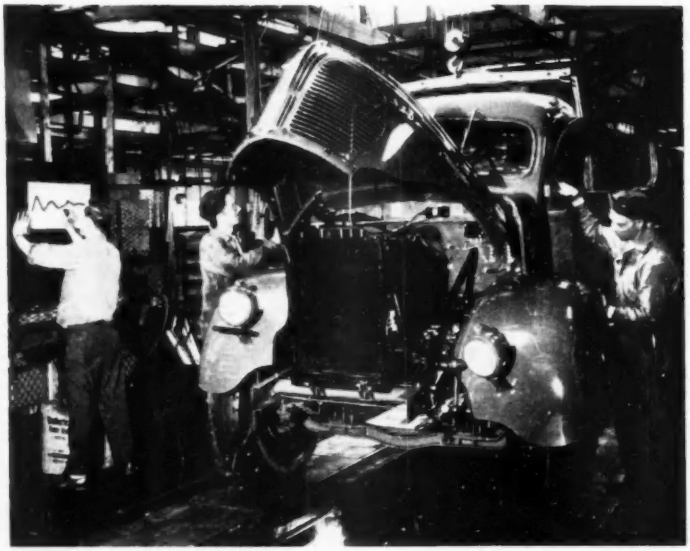


Fig. 5—Steering wheel selector lever and drive indicator



Quality At

Fig. 1—Control station at cab drop records errors in assembly of cab and engine to chassis.

QUALITY control is a mass-production technique, which, if properly employed can guarantee a better product at a reduced cost. It removes the necessity of high-pressure supervision or appeals to idealistic and economic stratagems. Through its use some of the problems of production are reduced to a statistical procedure. The quality control chart circumvents the individual and exerts no personal pressure, therefore it cannot elicit any counter-attitude. The attitude mostly encountered at the initiation of control ranges from mild curiosity to indifference. As the better workers begin to show pride in their records, indifferent individuals begin to exhibit interest, not antagonism. There is no argument with the facts because the production story is on record. However, the charts must not be interpreted indiscriminately. Often a poor record on one chart may be due to faulty work on a preceding station. Fig. 1 and 2 indicate how control charts may lead back to the source from which faulty materials or workmanship arise.

Quality control pins responsibility to an individual. As an example, the crankshaft line was producing 27 per cent defective units, 1 6 of which were completely unsalvageable. A tabulation chart was put on the end of the line to give a picture of the type of errors that appeared most frequently. In turn, charts were then put on each of these troublesome operations. At the end of the first week some amazing discoveries were made.

In the first place, the operator who placed the locating points at the very beginning of the line, allowed 12 per cent of his pieces to go by mislocated. From then on 64 operations were applied to this piece which was destined to be scrap from the very start. Every piece could have been inspected on that operation; but then by the same

Fig. 2—Dynamometer test of final engine assembly. Here the quality control chart may lead back to the source from which faulty materials or workmanship arise.

Control Program Reo Reduces Costs

By Julian K. Miller
Director of Quality Control
Reo Motors, Inc.

Dollars saved at Reo Motors through application of an intelligent quality control program are only one of the benefits accruing from the highly workable statistical procedure described here. The program has secured, also, the almost automatic cooperation of the workers themselves.

token there should also have been 100 per cent inspection on the subsequent operations. Quality control makes such detailed inspection unnecessary. In fact a much higher degree of accuracy can be attained by statistical procedures than by relying on 100 per cent human inspection which is subject to a higher degree of fallibility.

Bearing size also caused a good deal of trouble. Fig. 3 shows an operation which employs 22 cutting tools simultaneously. Formerly this operation was responsible for most of the scrap produced on the crankshaft line. This machine produced many bearings which were undersize and/or too wide. At the present time it is almost impossible for this operation to produce any scrap at all. The chart on the job indicates the trend of operations hourly. In fact the men on the job have become so aware of deviations from the norm that they are eager to draw such instances to the attention of the inspector since they would prefer not to have scrap appear on their charts.

Incidental to maintaining quality, the charts also located a "gold brick." One old-timer who was supposed to rough turn pin bearings to within 0.010 in. left as much as 0.200 in. to 0.300 in. stock on the bearings. The man

$

Table I—Breakdown of Costs for Crankshaft

Cost of forging	$18.76
Cost of labor	3.77
Cost of burden	9.43
Total cost	$31.96

	May, June, July*		Oct., Nov., Dec.	
Total output	4440 units		4276 units	
Scrap	114 units	$3,643.44	51 units	$2,588.76
Salvage	1471 units	$21,785.51	299 units	4,417.19
Total cost		$25,428.95		$7,005.95
		7,005.95		
Difference in cost		$18,423.00		*Controls begun
Av. total saving per mo.		$6,141.00		in August.

Table II—Breakdown of Correction Costs after Truck Assembly

	February*	April
No. errors per unit	42	6
Average cost of each repair	$ .97	$1.16
Repair cost per unit	$40.74	$6.96
Unit output per mo.	360	360
Repair cost per mo.	$14,666.40	$2,505.60
	2,505.60	
Difference in repair cost	$12,160.80	
Wages per mo., 7 repairmen	1,659.00	* Controls begun
Total repair cost savings per mo.	$13,819.80	in March.

Fig. 3—The chart on this center-drive crankshaft main bearing station indicates the trend of operations hourly.

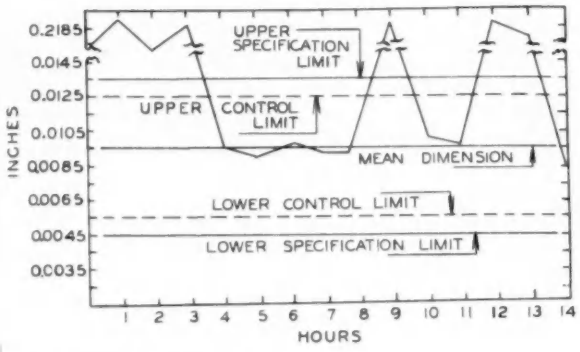


Fig. 4—Facsimile of control chart recording amount of stock left on pin bearings after rough-turn operation. The high points on this chart indicate that the operator was not removing sufficient stock to bring the pieces within the dimensional control limits. One sample piece was inspected at each hour interval.

on the finish-turn operation who was supposed to remove 0.005 in. to 0.010 in. shouldered the burden of both operations. Nothing was said to the old-timer. The second week everybody's chart on the line except his was within control limits. The chart, Fig. 4, taken from that operation kept reminding the operator that he was not doing the job he was supposed to do. He succeeded in controlling his operation the moment he decided he was conspicuous, but then he found it difficult to meet the production quota so he slipped back to the old routine. Finally he asked that a time-study be re-made so that he could determine what was expected of him. Formerly he turned out enough crankshafts to keep two finish men busy. Now there are the same number of men doing each operation; also the same crankshaft line produces only 0.1 per cent scrap. Quality controls on this line alone effected a saving of over $6000 per month as shown in Table I, which gives a breakdown of costs to produce crankshafts with a comparison of costs prior to and after the installation of quality control.

Quality controls are not limited to dimensional operations. They can be used to maintain uniformity of attributes as well. Trucks formerly rolled off the assembly line with an average of 42 defects per unit which required repair before passing final inspection. Within the first month after the initiation of quality control the total number of defects per unit was reduced to six. This resulted in a saving of approximately $36.00 per unit or almost $14,000 per month (See Table II). Incidental to this achievement it was found that of the nine men formerly employed in the repair department, two could now handle the repairs needed. The savings effected here cannot be overlooked but savings achieved from wages as compared to those obtained from production and reduction of scrap are insignificant.

Therefore it is not advisable to stress the value of quality controls as a means for diminishing personnel or as a wage-saving device. These are not the primary nor even the desirable objectives of quality control. The big money saving in quality control is to be found in its ability to maintain the highest quality, with maximum efficiency at minimum cost. It is easy to sell the "Company" on money-saving devices but ultimately it calls for the cooperation of the man at the bench. He cannot be asked to cooperate in a program that will reward his efforts with an early dismissal notice. Again, the success of a program will depend upon the ability in seeing where everybody's interests lie in this program and in using these interests to the betterment of every one concerned. Quality control is a meritorious program which should and can achieve the cooperation of every one. It protects the able worker and exposes the fraud. Every honest man will welcome it.

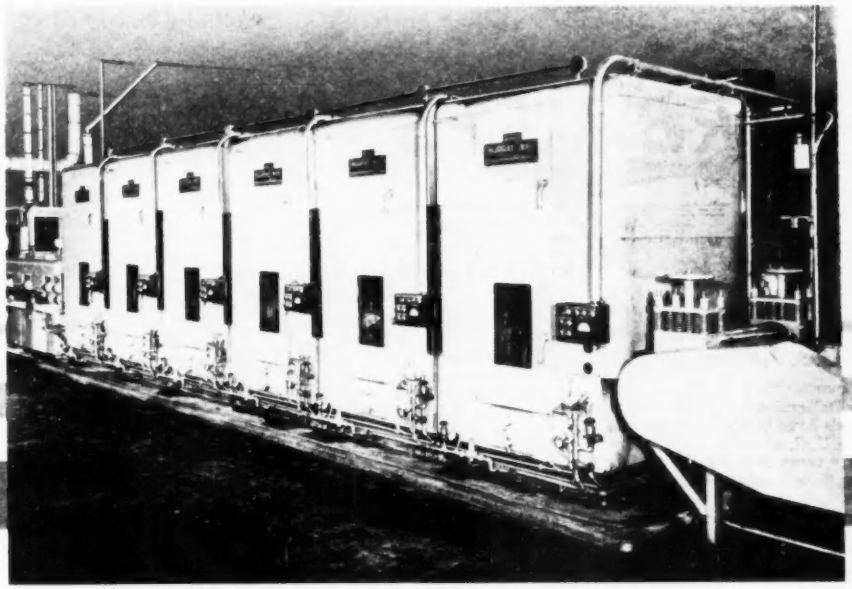
From a personnel-relationship standpoint, quality controls have had some interesting effects. The essence of successs in the program lies in the ability of the control director to just go about his business and keep mum. The quality control man is the liaison between the production line and the executive; as such he is placed in a position of personnel responsibility. If quality control is new in the plant, foremen, supervisors, etc., will resent intrusions into their precincts; therefore the quality control man need not assume any presumptions but simply make his reports and recommendations to the executive. The executive in turn will forward these to the foremen via the usual channels.

The foreman or supervisor will soon come to realize that it is to his advantage to have the quality control man report to him first and therefore obviate the necessity of faults being brought to the attention of higher authority. This will result in amiable relations between all concerned, since the foreman recognizes that the quality control man is assisting him to eliminate errors which reflect upon his supervision. Management in turn has no objection to having things settled favorably at the source of difficulty.

There is no question that the quality control program, if properly administered, can practically guarantee better personnel relations, improvement of product and remarkable savings to the Company. Improperly applied, the same items will be affected inversely.

At Reo there are fewer inspectors now than formerly. Yet there is much more inspection. The reason for this is that the control program has made the worker quality-conscious and skill-proud. He no longer is

(*Turn to page 86, please*)



A group of six abrasive belt machines for prefinishing steel in the flat before it is formed into bumper bars. Some installations employ three, four, or five machines.

Lowering Costs by Prefinishing Bumper Bars

AUTOMOBILE bumper bars are made of steel, in one piece or in three, cold formed or forged, and are chrome plated, with a mirror finish. Regardless of the type of steel bumper used, one of the difficult and time-consuming operations in producing them is the polishing of the formed steel preparatory to plating. The shape is not a complex one, but the double curve of the steel surface has meant installing a battery of polishing machines with formed wheels, or the even more costly matter of polishing by hand with a wheel on a pivoted lever.

A new method of handling the problem—polishing the steel in the flat with abrasive belts—has recently been adopted by one of the large automobile plants, by Standard Steel Spring and Bumper Co. of Coraopolis, Pa., and by Electric Auto-Lite Co. of Sharonville, Ohio.

Although the new method is limited to the cold-formed type of bumper bar, its success may make this type of bumper more attractive to the process engineer. In addition, the automobile industry is experimenting with the idea for other formed steel parts, particularly certain grilles. Polishing before forming has been suggested for steel that need not be plated, but for which a smooth finish under paint would be an advantage. Adherence of paint is said to be superior to that with several other treatments in the parts tested, and the prefinishing process makes it possible to obtain this finished surface at a cost that is moderate.

The new method employs a series of three to six abrasive belt machines. The flat steel stock is passed through the machines once and receives rough grinding, fine grinding, and final polishing in a single processing step that produces a surface ready for plating. The usual copper- or nickel-buff in the series of plating operations is retained.

Immediately after coming from the belt grinders the steel is coated automatically with a removable protective finish. This may be a strippable lacquer, sprayed on in a thin solution, or a water-soluble coating, applied by spray, dip or brush. Either will prevent handling marks on the highly polished steel surface, and will protect the material during the cold-forming operation. Forming between dies is done as usual, and the shaped piece, when ready for plating, is stripped of its coating by directing an air-blast against it, if the lacquer was used, or by immersing in water or flushing with a jet of water, if the water-soluble film was employed. The bumper is then started through the plating system in the usual way.

Users report the following advantages for the prefinished bumpers bars:—1. Improved appearance of the finished product; 2. Lengthened die life; 3. Reduced number of rejects; 4. Increased plant capacity without increasing costs; and 5. Lowered unit cost.

AIRBRIEFS

By ROBERT McLARREN

Why No U. S. Jet Transport?

The successful first flight tests of England's DeHavilland DH 106 Comet and Canada's Avro C-102 jet transports has put the U. S. aircraft manufacturing industry three to five years behind the international technical eight-ball. But this embarrassing position is through no fault of the industry's engineers, to have been ready, willing and able to turn out a jet transport any time since V-J Day. In most major plants design studies of jet transports have been gathering dust for as long as five years while the engineering departments awaited the "go ahead" signal from the front office. But that signal has not come for two reasons: (1) Generally, U. S. airlines and the military transport services do not want a jet transport, and (2) neither the airlines nor the manufacturers have the $10-$20 million needed for the job. Thus stymied, the engineering departments have been frustrated by their British cousins, who have gone full-speed ahead on their two projects. Yet it is paradoxical that this richest-of-all-nations can't afford a jet transport while financial-crisis Great Britain can get the job done in lavish fashion.

Policy Decisions

Underlying cause of this paradox is the undeniable government control of such matters in both countries. Donald Douglas consulted no one when he produced his ubiquitous DC-3 in 1933-34 in the American business spirit of the better mousetrap. But Douglas would do plenty of consulting before flashing the "okay" on development of a jet transport, because a $10 million investment is not something to be regarded as a mere gamble. As far as we can determine, no U. S. airline has a genuine, immediate interest in a jet transport for a variety of reasons: (1) The airlines are heavily mortgaged for postwar piston-engine transports, which they plan to use for five years or more before giving serious study to replacement; (2) The economics of the jet transport, despite the elaborate studies of its advocates, are still highly debatable and; (3) Operational problems, growing out of the mechanics of the jet transport itself, are substantial and complex. Britain, in a preening of feathers, has swept aside such considerations in favor of the more electric "Britain Must Rule the Skies" type of administrative thinking.

Passenger Preference

But the dark cloud that voids our current "you go your way, I'll go mine" attitude is the strong probability that the incomparable comfort of the British jet transport will cause U. S. passengers to demand the same type of air travel in this country. The lack of vibration and noise (forward of the jet nozzles), the greatly increased speed and the social value ("I came down by jet transport!") are advantages that make the jet transport the inevitable type in all airline operation at some future date. This reporter, having once ridden a two-seat jet fighter, is mildly annoyed by the piston engines and propellers on transports he has flown on since. And the lay passenger, incomparably more sensitive to the unique characteristics of the air vehicle (and therefore more critical) is certain to have more than a "mild annoyance" with conventional aircraft after having become a jet transport traveler. But one thing is certain; on the day the first airline in the U. S. announces a contract for jet transports, all other trunk lines will sign up in short order. But none that we talk to want to be first—yet.

Helicopter Mail Spreads

Following the pioneering and enormously successful introduction of helicopter mail handling between the airline terminal and the Post Office building and between the latter and scores of outlying communities in the Los Angeles region by Los Angeles Airways nearly two years ago, Chicago is now receiving helicopter air mail service by Helicopter Air Service, Inc., which rushes air mail from the airport to the downtown Post Office roof in 10 minutes. Next area to be approved by the Civil Aeronautics Board and the Post Office Department will be Boston. Now comes word that the Belgian postal administration has asked Sabena, Belgian airline, to make a cost study of a helicopter air mail operation in Brussels.

Military Production Gloomy

Recent Senate action in slashing the House-approved fiscal 1950 Armed Services appropriation bill means that the 70-Group program is again torpedoed in favor of President Truman's adament stand on a 48-Group Air Force. This means that instead of building 5369 military aircraft, the aircraft manufacturing industry will only build 1669 new aircraft. The Air Force has contracted for 2414 airplanes out of fiscal 1949 funds. But the really tragic news is that not only has the fiscal 1950 budget been slashed but the fiscal 1951 budget, now in preparation by the Department of National Defense, will further cut aircraft procurement to only 1226, or almost one-half. Thus, while both the House and the Senate endorse the idea of 70 combat groups, they refuse to provide the money. Washington observers are certain that the aircraft procurement program is tied up inextricably with the news from Moscow and, that news being very quiet for the past six months, Air Force procurement money is going begging. But at the first roar of the Russian bear again, up will go appropriations for combat aircraft. And that, in most estimations, is one heckuva way to operate a long-range aircraft procurement program!

Nonsked Solution

U. S. trunk airlines have fought their battle with the cut-rate non-certificated carriers in costly legal procedures before the Civil Aeronautics Board. Western Air Lines was forced to take a different approach since its nonsked competition over its fruitful Los Angeles—San Francisco segment operated intrastate and thus beyond reach of the CAB. Western fought its battle in the newspapers and local courts for two years then took a more direct approach: set up Western Air Lines of California, an intra-state carrier! On the "if you can't beat 'em—join 'em" theory, Western of Calif. offers the air traveler regular certificated airline transports, flight crews, service and maintenance, ticket offices (including any Western Union telegraph office), dispatching and weather reporting, and standard scheduled airline passenger insurance! The reaction was instant and profuse: nonskeds threatened injunctions and court actions and claimed the new service illegal. On this "you can't do this to me" reaction, Western Air Lines of California is happily ringing up the cash register of its parent company. Now the other trunk lines are worrying over the probability they will have to do the same thing to meet this competition.

Electronic Stability

Aircraft dynamic stability is one of the most complex subjects on earth but its use frequently leads to the sophomore error of obtaining results to six

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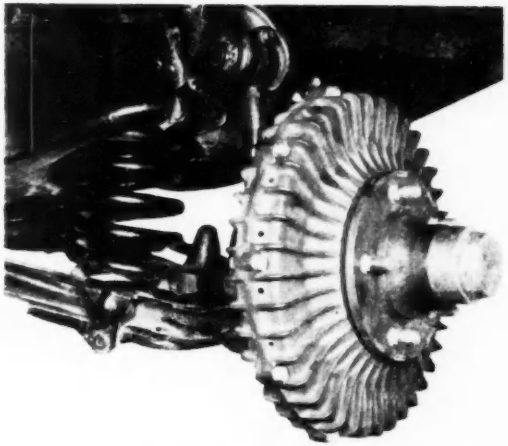
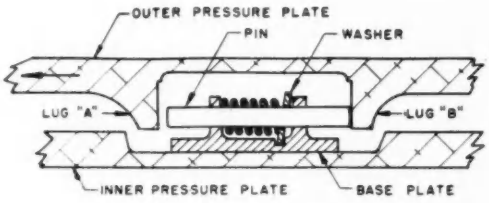


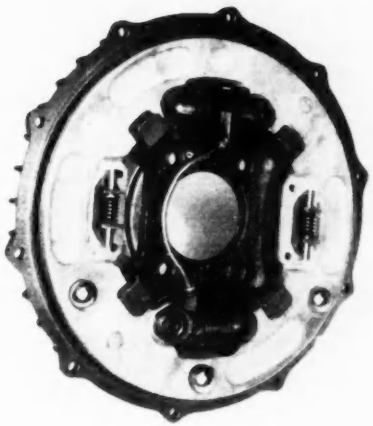
External view of a front wheel brake assembly. Front brakes are self-energizing when the car is in forward motion only; rear brakes are self-energizing in both directions.

More On Chrysler Disk Brake

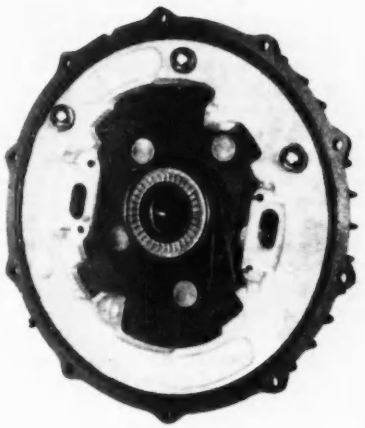
SHOWN here are some additional details of the new Chrysler self-energizing, self-adjusting disk brake which was described and illustrated in the Sept. 1 issue of AUTOMOTIVE INDUSTRIES. Note especially the simple self-adjusting devices which maintain proper clearance between the linings and housing during the life of the linings.



(Left) Self-adjusting mechanism (brake applied). There are two of these units, mounted 180 deg apart on the inner pressure plate with the pin located between the two lugs on the outer pressure plate. The pin is slightly shorter than the distance between these lugs to allow sufficient rotation of the plates in relation to each other for proper lining clearance when brakes are released. As lining wear occurs and relative motion between the pressure plates increases, the pin is moved to a new position where it is held by the washer. This washer is located in a groove in the base plate and is kept in a cocked position on the pin by a compression spring, the opposite end of which seats against a guide flange of the base plate. This arrangement permits motion of the pin in one direction only.

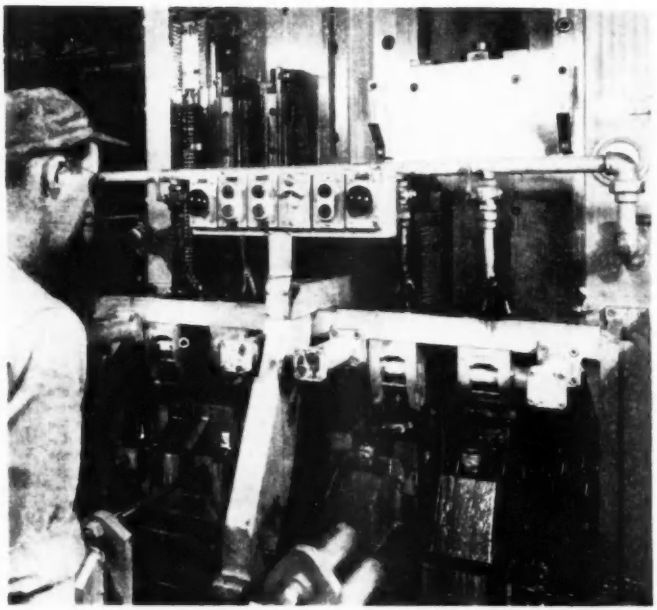


(Above, left) Inner housing assembly of left front brake. This view shows the spider, two hydraulic cylinders, inner pressure plate, and self-adjusting mechanisms. Front brakes have 1¼-in. dia cylinders while those on the rear brakes are 1-in. in dia.



(Above, right) Outer housing assembly of left front brake. When assembled, the return springs on the outer pressure plate will be attached also to the inner pressure plate to hold the plates in released position.

Latest Machining Methods



Enormous Oilgear surface broaching machine is used for producing the joint face and half-round bore, and sides and seats of bosses on the crank end of connecting rods and caps. The broach is of dual-ram type with two fixtures. The fixture at the right holds two rods, while the one at the left holds two caps.

IN Part One of this article which appeared in the September 1 issue of AUTOMOTIVE INDUSTRIES we described some of the major machining operations on the cylinder block and head for the new Reo Gold Comet Type OA valve-in-head engine. Part Two is intended to give a similar sampling of operations on the piston, connecting rod, and crankshaft.

As illustrated, the piston is of rather interesting heavy duty design, being a casting of Lo-Ex aluminum alloy. It has a concave machined head and cam-ground, elliptical and tapered skirt. The heavy slotted bulkhead at the lower end of the skirt serves functional design as well as a major locating point for machining operations.

An impressive feature of the piston machine line is the installation of six special Ex-Cell-O precision boring machines for turning and ring grooving as well as core drilling and boring the piston pin holes. Another feature common to the piston line is the development of interchangeable tooling to facilitate the handling of a family of three or more different pistons on the same machine.

First operation on the piston is the rough-turning of the OD and facing of the closed end part way. This is done on a No. 1212 A Ex-Cell-O double-end precision boring machine, illustrated here, using cemented-carbide tools. For this operation the piston is loaded on pin chucks. Next the piston is transferred to a single-end Ex-Cell-O where it is located from the turned spot on the head and the OD, and is semi-counterbored on the open end to provide location for succeeding operations. At the same time the skirt is finished to length, chamfered at the open end and the inside diameter.

Pin bosses then are core drilled in a two-way Ex-Cell-O, locating from the counterbore and pin bosses. The closed end is finish-faced in a No. 2112 A Ex-Cell-O precision boring machine. Here the work is located from the counterbore in the open end and the core drilled pin hole.

Drilling for a saw slot and sawing of two slots is done progressively in a Govro-Nelson drill unit, and a No. 3 Garvin hand mill.

Next in line is a No. 215 A Senior Ex-Cell-O double-end precision boring machine in which work is located from the counterbore and pin boss holes. The operation includes: semi-finish turning of ring grooves, chamfering ring grooves, finish-turning ring grooves, finish-turning top two lands, finish-turning skirt OD, finish-turning the OD of the third ring land, and chamfering OD of the closed end.

This machine is tooled for a production of 360 pieces per hour. A unique feature is the provision of a horizontally slidable tool block for the ring grooving operation. At the beginning of the cycle, the semi-finishing tool block comes in, later the finish-grooving section is indexed into position for the final cut.

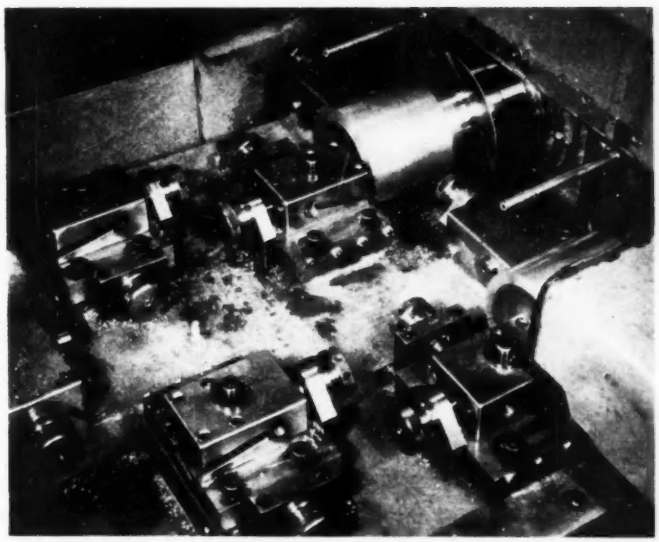
Applied to Reo Gold Comet Engine

Part Two

By Joseph Geschelin

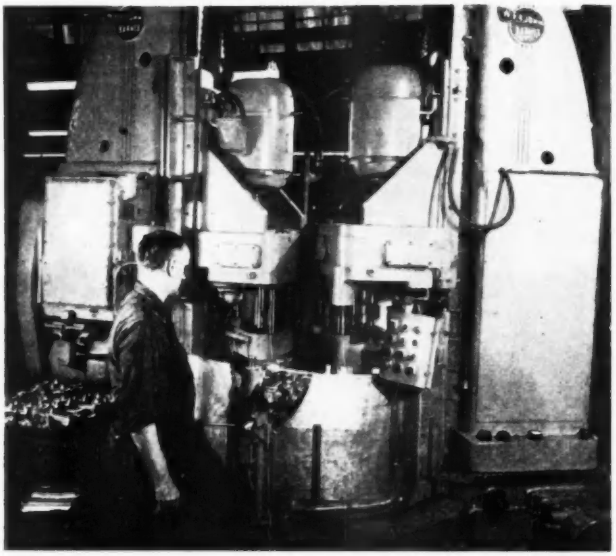
Drilling of five, $\frac{1}{8}$-in. smoke holes, and one hole in the skirt, is done in a special machine having six Govro-Nelson drilling units mounted radially about the centrally placed piston. Prior to the grinding operation, pistons move to a No. 215 A Senior Ex-Cell-O precision boring machine for finish-counterboring the open end. This establishes the major dimensions of the piston with respect to compression clearance volume in the assembled engine.

Cam grinding of the skirt is done in one of the latest models of the Norton 10 by 18 cylindrical grinder equipped with the Norton Cam-O-Unit. Here it is necessary to produce a rather intricate skirt formation, a combination of an elliptical form and a taper. For this purpose, the piston is held at the tail stock by



Connecting rods reach the assembly stage after rods and caps are drilled in pairs in this Cross, five-station rotary drilling and reaming machine.

First operation on piston — rough turn OD, and face closed end part way—is handled in this two-way, four-spindle Ex-Cell-O precision boring machine, shown in close up of the table.



W. F. & John Barnes, five-station, center column drilling machine for drilling, core-drilling, reaming, and countersinking both sides of the pin hole in connecting rods.

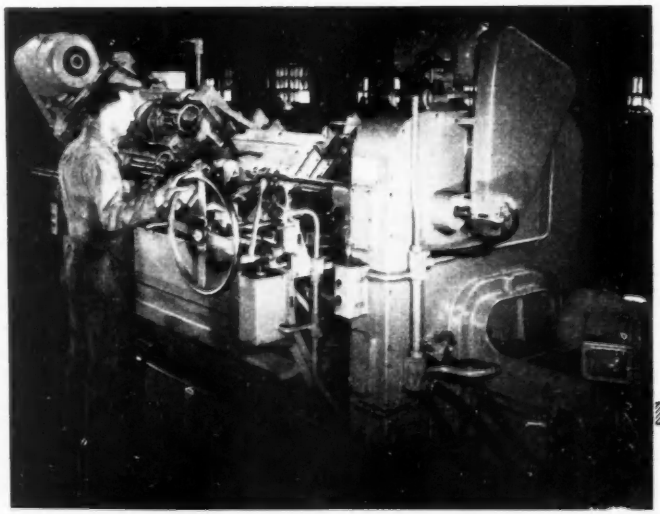
means of a supplementary loading fixture—a special plug fitting into the counterbored end. At the head stock the piston is held in a driver so designed as to permit rocking of the piston between the tailstock and headstock mountings to produce the taper.

Last major operation is weighing and balancing to weight in a 13 by 25 LeBlond lathe, using a set of Exact scales for weighing. Excess metal is removed from the counterbored end. Following weighing pistons are bronze plated in a system of eight tanks with the following sequence: alkali clean, water rinse, acid rinse, water rinse, plating bath, water rinse, acid bright dip, hot water rinse.

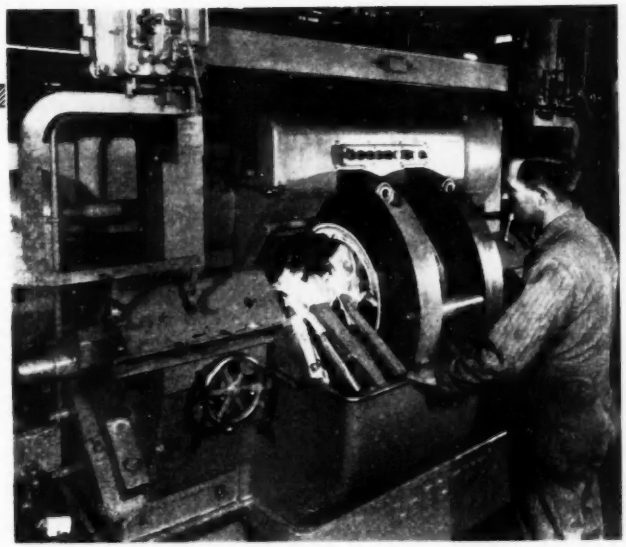
Finally the piston pin holes are semi- and finish-bored and lock ring grooves cut in a No. 215 A Ex-Cell-O double-end precision boring machine with a three-station fixture. Pistons are located from the counterbore and pin holes. The pin holes then are burred, and Bear-ingized.

Connecting rod machining has been skillfully developed in keeping with functional design requirements and productivity. The Reo rod is a two-piece forging. The operation starts with semi-finish grinding in an enormous Hanchett, three-head, center column rotary surface grinder. The large indexing fixture, about 100-in. in diameter, is arranged to hold both rods and caps. It has automatic clamping and features continuous movement. When rough forgings are placed in the fixture, they are ground on one side, then turned over by the operator to finish the other side. The crank end of the rod and sides of caps are semi-finish ground, while the pin end is finish-ground. The machine is capable of producing about 200 sets per hour.

A special W. F. & John Barnes column drilling machine with a five station indexing table is used for drilling, core drilling, reaming, and then counter-sink-



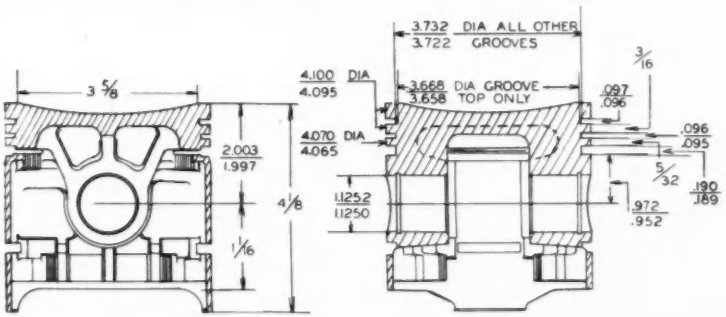
Shown for its novelty is this double-end, W. F. & John Barnes drilling machine for the crankshaft flange and front end. It has a four-station trunnion fixture, each station having two sets of tooling. Only one set of tool heads is used at a time, the double setting permitting Reo to handle two different crankshafts without changing the tooling.



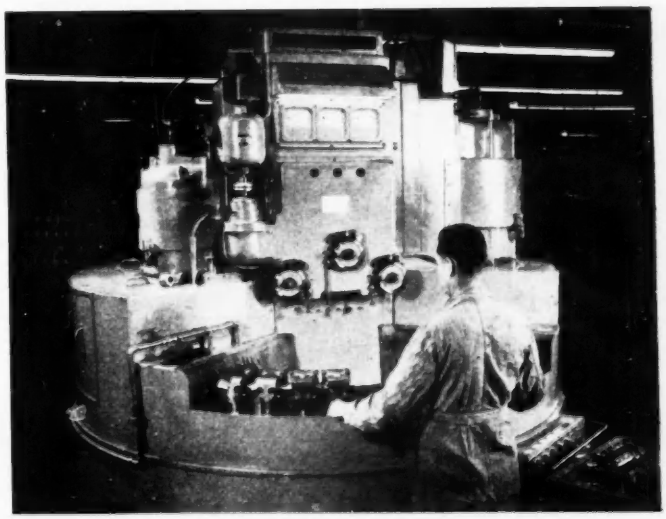
Close-up of one of the enormous LeBlond No. 7-ACL crankshaft lathes. This one, at the start of the line, does the rough turning of main bearing journals, gear fit, pulley diameter, and OD and face of flange. As shown, it has a double center drive and features the LeBlond mechanical loading and unloading device at the ends of the machine.

ing both sides of the pin hole.

The formations at the crank end of the rod and the cap are produced by surface broaching with an excellent surface finish in a dual ram, XD—30 by 66 Oilgear vertical broaching machine. It has two stations—one for the rod, the other for the cap. The operation at both stations includes: rough broach joint face and half round, finish broach sides and seat of bolt bosses. For this operation the rod is located in the fixture by means of the piston pin hole and two locating bosses on the sides at the crank (*Turn to page 58, please*)



Drawing of heavy duty aluminum piston for OA engine.

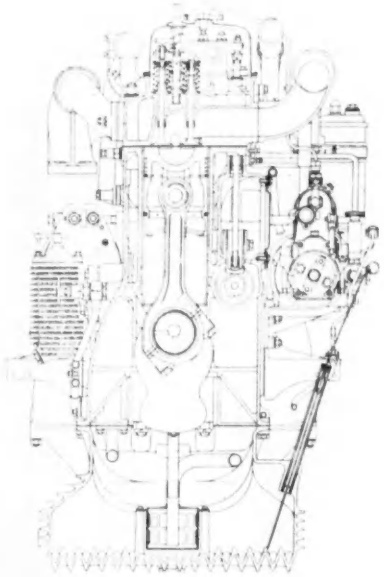


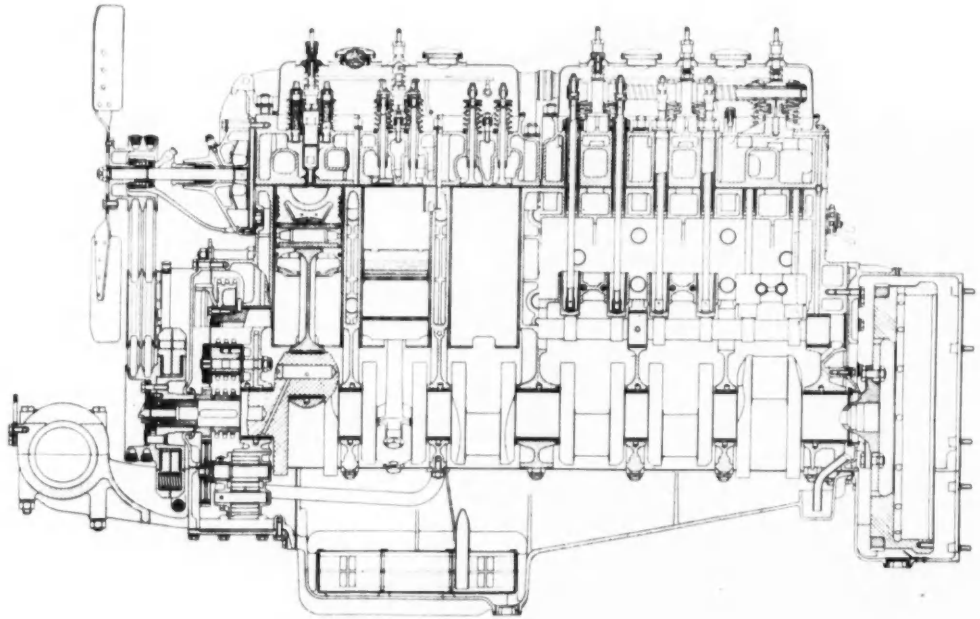
One of the Hanchett rotary surface grinders on the connecting rod line. This one does the finish grinding of the sides of the crank end on both rods and caps.

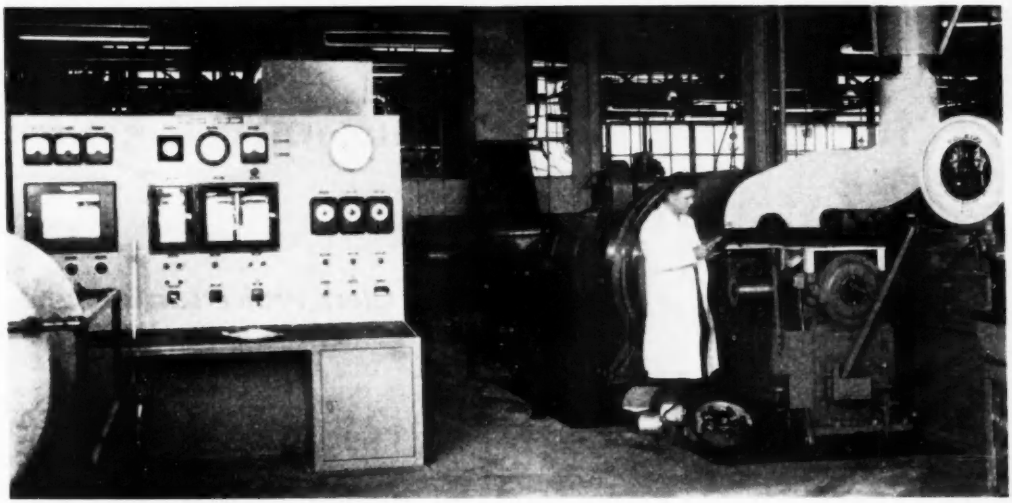
New Fiat Diesel Engine

(Right) Longitudinal section of the Fiat 680 N Diesel engine. It has two intake and two exhaust valves per cylinder, one of the intake valves having a deflector to impart a swirling motion to the incoming air.

(Left) Cross section of 680 N engine. Note that one rocker arm actuates two valves. This engine has a bore of 4.8 in., a stroke of 5.71 in., and a piston displacement of 620 cu in. It develops 123 hp at 1800 rpm.







This view shows (left) the control panel, and (right) flywheel and testing equipment.

Huge Dynamometer Tests Heavy Duty Brakes

WHAT is said to be one of the largest machines in the world for testing automotive brakes is now in operation at the Bendix brake laboratories, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind. This new machine makes testing facilities available for the development of truck and bus brakes, large off-the-highway vehicles, road graders, tractors and heavy duty farm machinery.

The present automotive equipment at Bendix includes two brake dynamometers, one with a fixed flywheel which depends on the motor for developing power. The other has an adjustable flywheel and requires almost no power input after the flywheel is rotated up to the speed for energy. The kinetic energy of the flywheel at 2000 rpm is 1,200,000 ft lb.

The new testing equipment is a combination of the two types using the motor and the inertia of the flywheel for energy. An extra pad or motor base is installed on the huge dynamometer frame so that an additional motor may be added at any time. The minimum capacity of the new machine starts where the maximum capacity of the smaller ones leaves off.

The new machine consists of several units mounted on a base 30 ft, 3 in. long by 7 ft wide. The first unit is a direct current dynamometer motor which develops from 200 hp at 450 rpm to 600 hp to 450 rpm with a maximum of 2000 rpm. Connected to this motor is the dynamometer flywheel which is made up of movable disks 62¾ in. in diameter; 17 are ½-in. disks, each weighing 420 lb, and 11 are ¾-in. disks each of which weighs 630 lb. The master disk is 1½ in. wide. The combined disks make up a flywheel weighing 16,685 lb with an 18¼-in. face.

This flywheel is designed to duplicate the energy of a minimum 4060 lb and a maximum 40,450 lb road vehicle. Torque shafts, one 6 in. and one 4 in. in diameter, are carried in bearings 16 in. apart. These bearings have a capacity at 500 rpm of 19,350 lb. The torque arm is 21,500 in. long and the distance from the center of the flywheel to the center of torque arm is 80 in.

A Toledo scale, capable of measuring a load of 15,000 lb which is used to measure the developed brake torque, has a maximum capacity of 302,500 in. lb; and is connected to an automatic recording instrument.

Controls of this powerful machine are mounted on a separate panel and master control desk. Instruments used include chart recording chronograph pens, tachometer generator, electric counter, Chronoflex automatic reset timer and counters, electric clocks, and hydraulic pressure gage. Other units not mounted on the main base include a motor generator unit—the motor developing 380 hp at 1200 rpm, and the generator producing the direct current to drive the dynamometer motor—also an amplidyne exciter group consisting of two amplidynes, exciter and a 20 hp motor.

A brief description of the procedure in testing an

(*Turn to page* 94, *please*)

Electro-Magnetic Transmission of Planetary Type

Developed by Clerk Projects in England

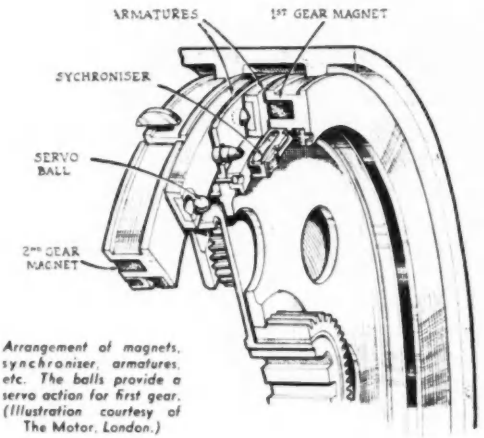
By W. F. Bradley,
Special European Correspondent
of Automotive Industries

London, England

A PLANETARY, electrically-controlled, four-speed transmission has been produced by Clerk Projects, Ltd., of 24-28 Clapham High St., London, for use with the Ford V-8 engine and torque tube assembly. Up to the present, the unit appears to have been used principally in Fords modified for racing purposes.

Control is electrical, with a lever mounted below the steering wheel. Selection of ratios is by friction brakes and a friction clutch, direct drive being through a plate clutch, which is electro-magnetically engaged.

Outstanding features are the use of a simple servo mechanism to handle the highly loaded disk brakes for first and reverse gears, also synchronizer units in each of the forward gears to prevent switching on the main clutch or brake-actuating electro magnets until engine and car speeds are correctly matched. The servo mechanism consists of a series of hardened $\frac{3}{8}$-in. steel balls seated in holes through the brake disk and engaging with shallow conical recesses in the annular electro-magnetic armature. With any tendency to slip, the steel balls are dragged around circumferentially, when they will attempt to ride out of their conical recesses, forcing the armature halves apart and producing extra load on the braking surfaces.

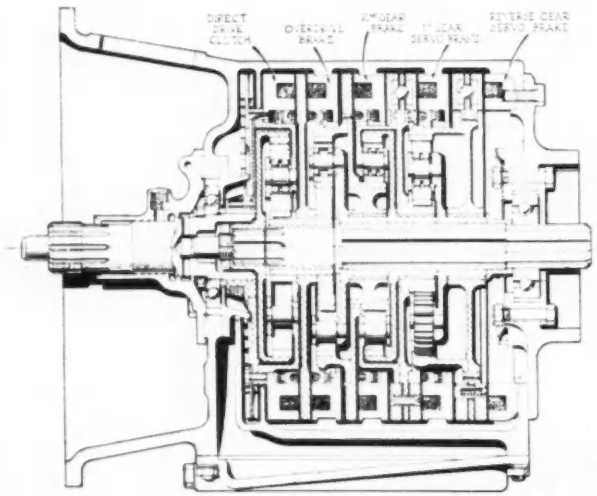


Arrangement of magnets, synchronizer, armatures, etc. The balls provide a servo action for first gear. (Illustration courtesy of The Motor, London.)

Current consumption at 12 volts is 0.62 amp in fourth and third, 1.62 amp in second and first, and 2.05 amp in reverse. Overall dimensions are $9\frac{1}{2}$ in. diameter by 9 in. long for the 125 lb-ft transmission and 13 by 16 in. for the 330 lb-ft overdrive five-speed unit.

Provision is made for locking third or any other indirect gear in engagement by means of a reversible plug in case of current failure. Planet wheels are mounted on roller bearings and low pressure lubrication is provided for plain

(*Turn to page 86, please.*)



Longitudinal section of the new Clerk epicyclic gear box. (Illustration courtesy of The Motor, London).

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Feet and wheels, too, find positive traction on Inland 4-WAY Safety Plate. That's why 4-WAY cuts down plant accidents. Its raised lug pattern provides positive traction—on steps, floors, ramps, walkways, platforms—grips firmly in all directions. If slipping accidents are causing lost man hours in your plant (or if slip-resistance will improve your product), find out more about 4-WAY Safety Plate.

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E-38—Diagonal Gear Shaving Machine

Improving on their first fully automatic loader for gear shaving machines, originated and developed a year and a half ago and which was limited to small pinion gears, National Broach & Machine Co., Detroit, Mich., now make it possible for gear manufacturers to shave all types of external transmission gears regardless of size and including cluster and stem gears and also timing gears.

Equipped with the automatic loader, the gear shaving machine runs continuously as long as the magazine is kept filled with work, one unskilled operator easily keeping the magazines of several automatic loaders filled and all machines running continuously.

Model GCU diagonal gear shaving machine and automatic loader illustrated is shaving a 32 tooth constant mesh transmission gear at the end of a cluster. This is a helical gear having 3.765 pitch diameter, 10.5 diametral pitch and a ⅝ in. face. The blank has an over-all length of 5.809 in. and it has an 0.875 in. diameter broached hole running throughout its length. Actual floor-to-floor time for this operation is said by "Red Ring" engineers to be 16 seconds, or a rate of 191 gears per hr at 85 percent efficiency.

The three smaller gears of this cluster can also be shaved at comparable production rates using the same loader and merely changing the setup.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 52

E-39—Washing And Pickling Machine

Featuring a new hydro-hermetic seal, a completely enclosed washing and pickling machine, developed by the R. C. Mahon Co., Detroit, Mich., is said to reduce pickling time to less than one-third and to vastly reduce the volume of solutions required in processing.

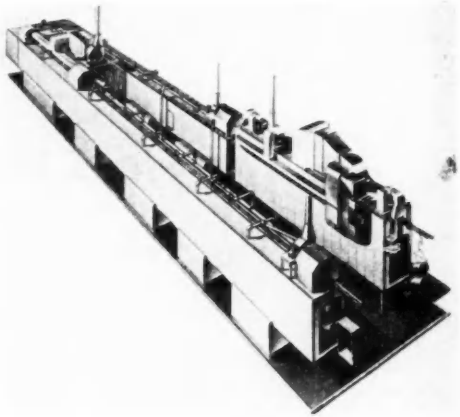
Now available to porcelain enameling plants for the preparation of metal surfaces to receive porcelain enamel, the machines can be designed to meet any requirement of product processing, production rate, or plant layout. This spray pickling equipment provides positive protection for continuous overhead monorail conveyor.

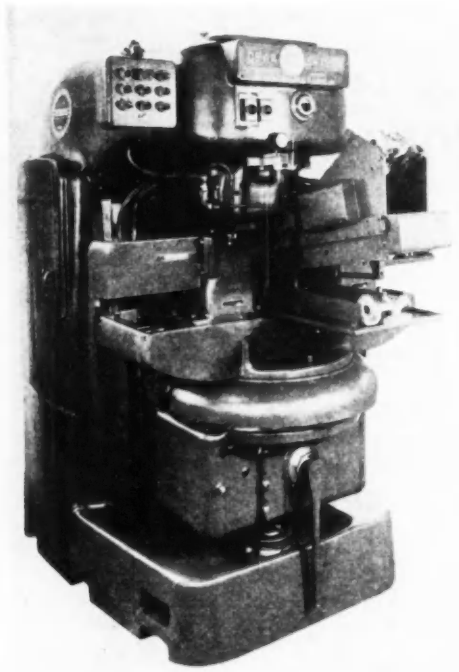
The process, continuous through all operations, consists of emulsion cleaning, clear water rinse, alkali cleaning, three stage water rinse, sulphuric acid bath, acid water rinse, nickel sulphate bath, sodium cyanide neutralizer, borax neutralizer rinse, and hot air dry-off.

Tanks and tunnel housing are of mild steel throughout except in areas where corrosive materials are in contact or fumes prevalent. In these areas, steel is lined with lead or rubber, or Monel Metal is employed. The monorail conveyor, which operates in the open above the machine, is fitted with Monel Metal adapters which are the load carrying medium that passes through the hydro-hermetic seal. No spray or fumes can escape or work up to the adapters to damage the conveyor.

The hydro-hermetic seal, which seals the top of this machine throughout its entire length, greatly increases processing efficiency in each stage and prevents loss of active chemical fumes. In thereby reducing ventilating requirements to a minimum, the seal eliminates both the necessity for a tremendous intake of air through an open conveyor slot—hitherto general practice, and the resulting necessity for replacement of air within the building.

R. C. Mahon washing and pickling machine featuring new hydro-hermetic seal





Diagonal gear shaving machine and automatic loader of the National Broach & Machine Co., Model GCU for automatically shaving all external transmission gears

E-40—Weld Energy Comparator

Westinghouse Electric Corp., Pittsburgh, Pa., is bringing out a weld energy comparator which gives a visual, or audible, or visual and audible signal. The unit can be interlocked for the

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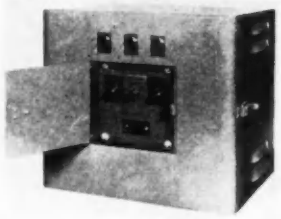
welding machine to lock out further welding in case the weld energy is not within pre-set limits. This comparator has been designed to check weld energy consistency on applications where high-quality welds are a must, as in the fabrication of high-alloy stainless steel used on jet engines.



Weld energy comparator manufactured by Westinghouse Electric Corp.

The weld energy comparator can be used with any Westinghouse single-phase spot welding control. It is provided with a sensitivity adjustment which may be set to any value required for the work, depending on the accuracy of the welding control unit, whether synchronous or non-synchronous. It detects changes in line voltage and changes in duration of welding current, and is recommended for weld time ranges of 30 cycles and below.

NEW Production and Plant EQUIPMENT

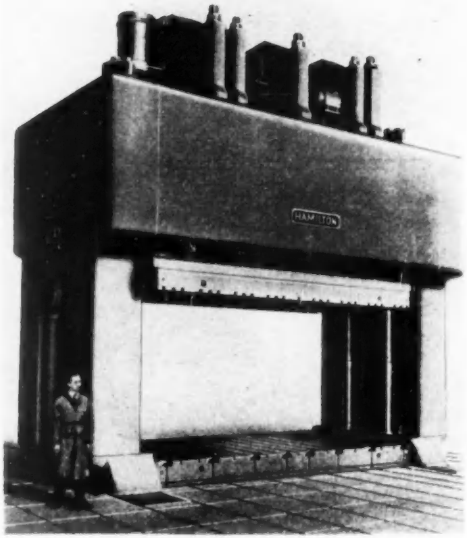
For additional information regarding any of these items, please use coupon on page 52

E-41—Triple Action Drawing Press

For stamping out the roofs of automobile bodies—the biggest stamping on a car—the Lima-Hamilton Corp., Detroit, Mich., has introduced its new Hamilton high-speed triple action drawing press, weighing over 600 tons with the dies. This high-speed unit, according to the company, provides a 75 percent increase in production of roof stampings, compared with machines of this type now in use. The press can use dies up to 200 in. long, and draws 24 in. deep. The drawing speed, or the rate at which the steel sheet flows into the die, is about 70 fpm, and the press operates at the rate of six strokes per min.

The company points out that any conventional triple action press designed to draw 24 in. deep, with a drawing speed of 70 fpm, would operate at only $3\frac{3}{8}$ strokes per minute, but that this high speed press, with its rate of six strokes, makes possible the 75 percent increase in production.

In the Hamilton press, the plunger slide is in the bed and travels upward when making the draw—the reverse of conventional type triple action presses. As a consequence, the new press provides another advantage in drawing the roof for an automobile body in that it permits the stamping to come out of the die right side up. In the conventional type press, this company states, the roof is drawn upside down, and must be turned over for subsequent trimming operation, such additional handling giving opportunity for scratches and other damage to the surface.



Lima-Hamilton high-speed triple action drawing press for stamping out automobile body roofs

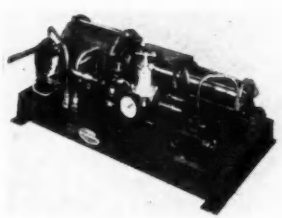
Lima-Hamilton is building several presses of this same high-speed design but about half the size of the press for automobile tops. These smaller presses will be used primarily for drawing outer and inner car door panels, and will operate at 16 strokes a minute with no greater drawing speed than the conventional type press for door panels, which makes only eight strokes.

The company says it is not humanly possible to produce 16 door panels per minute by hand-feeding. To obtain maximum production efficiency from the new Hamilton high-speed door presses, the sheet steel can be automatically unwound from the coil and fed into the press, which in turn will simultaneously cut the blank and make the draw. Subsequent operations sometimes requiring as many as five single action presses can also be mechanized.

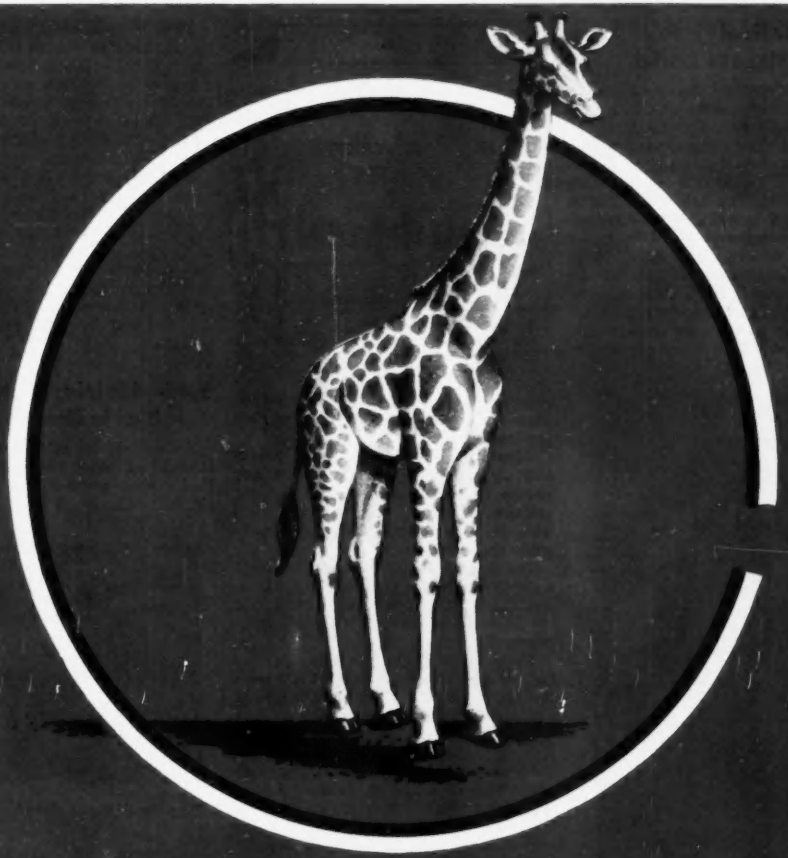
E-42—Steering Gear Grease Device

For delivering an accurate and controlled amount of grease into an automobile steering bearing on an automobile assembly line, a measuring device has been designed and built by J. N. Fauver Co., Inc., Detroit, Mich. The equipment comes complete with air regulator, pressure gage, air filter, air lubricator and manually controlled operating valve, air and measuring cylinders and valves for automatic operation. In the cycle or operation, pushing the operating lever allows the air to enter the air cylinder to actuate the measuring cylinder. When the end of the stroke is reached and the total measured volume has been delivered, both cylinders automatically return to position. Similar Fauver devices are available for measuring accurate volumes of gasoline into tanks, and oils into crankcases, as well as for measuring any kind of liquid and semi-liquid into various containers.

(*Turn to page 50, please*)



Fauver device for measuring grease into automobile steering gears



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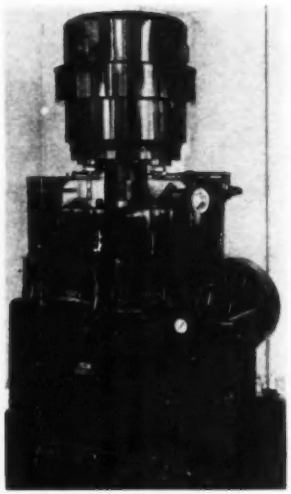
E-43—Vertical Continuous Lathe

Two features of the four-spindle vertical continuous lathe offered by the Baird Machine Co., Stratford, Conn., consist of its floor compactness and its design for continuous operation, thereby eliminating need for an indexing mechanism entailing attendant loss in non-productive indexing time. Approximate lathe dimensions are 42⅝ in. by 59⅜ in. and an overall height of 76 in.

On this continuous lathe each spindle has its individual set of cutting tools. In the operating setup illustrated below a cutting bar is used on which is mounted an end-mill adapted to face

NEW
Production and Plant
EQUIPMENT

For additional information regarding any of these items, please use coupon on page 52



Baird "Automatic 5" four-spindle vertical continuous lathe, No. 54 VC

mill the shank of a slip yoke and to chamfer the hole. Further, alternate spindles are set up to machine two different sizes. As the spindle carrier, in which the four work spindles and the four cutter bars are mounted, rotates every 15 seconds, a piece is delivered every 3.75 seconds. Total productivity of the machine is 900 pieces per hr, at 450 pieces per hr for each of the two sizes.

With an actual cutting time of 4.1 seconds, a work spindle speed of 496 rpm and a work stroke of ¼ in., the performance figures are 0.0076 feed per revolution and a cutting speed of 213 fpm for the end facing, 160 fpm for the chamfering, and stock removal of approximately 3/32 in.

Due to the slip yoke construction, with its two lugs for the cross-pin, two features are incorporated to facilitate loading and unloading. One is the positioning of the work spindle before it stops rotating, accomplished automatically as each spindle is disengaged and approaches the load cycle. The other is a swivel joint in each holding fixture, permitting the fixture to be swung out for loading and unloading.

This swivel joint is operated manually by the operator and if for any reason is not returned to its upright position, a safety device, interlocked with the motor control, automatically stops the machine.

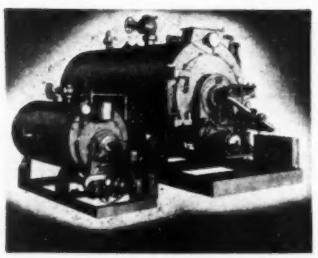
The work spindles are provided with a friction clutch for smooth pick-up and acceleration combined with a dog clutch for a positive drive when fully engaged.

When loading this work in the fixture, a live center, operated through the center of the cutter bar, engages the fixture for added support and also operates the expanding pins in the holding fixture. These pins centralize the work and assure concentricity. The live center is locked in place by a cam lobe, provision being made to by-pass this lobe should there be a need to rotate the machine backward. A hand crank is provided to manually rotate the machine backward.

As the work progresses through the cutting cycle, the cutter bar advances, controlled directly from the feed cam. A micrometer adjustment, easily accessible and built into each cutter bar, provides for an individual adjustment when the tools are resharpened.

E-44—Steam Generator

In steam generators announced by the Cyclotherm Corp., New York, N. Y., a new type high atomizing burner nozzle incorporating a primary air supply assures precise injection of fuel and air for efficient combustion at all firing rates. The new nozzle design permits interchangeable oil or gas firing without requiring a change of nozzle. The nozzle design combined with the Cyclonic Combustion principle maintains high combustion efficiency with either fuel.

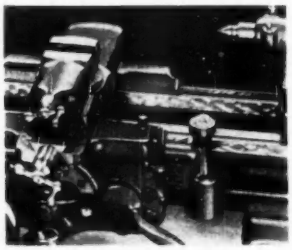


Steam generator of the Cyclotherm Corp.

The models include a simplified air supply system, improved combustion and ignition programming controls, and a blower-air channel design that achieves quiet operation. Generators are available in sizes ranging from 10 to 300 hp, and in pressures from 15 to 200 lbs.

E-45—Metric Thread Dial Indicator

As an aid in cutting metric screw threads on lathes equipped with metric lead screws, a thread dial indicator designed by the South Bend Lathe Works,



South Bend metric thread dial indicator

South Bend, Ind., saves much time when cutting long screw threads. Instead of reversing the lathe to return the cutting tool to the starting point, the half-nuts may be opened and the carriage moved quickly by hand. The graduated dial shows when to engage the half-nuts so that the cutting tool will follow the original cut.

To provide for the various pitches of metric screw threads, several gears having different numbers of teeth are mounted on the lower end of the thread dial shaft. The vertical position of the thread dial indicator is changed as required so that the correct gear for the pitch of the thread to be cut will mesh with the lead screw. Each graduation on the dial is marked with a letter indicating points at which the half-nuts may be engaged for certain threads. A chart is supplied with the thread dial to show which gear and which graduations must be used for each pitch of metric screw thread.

Although a similar device is in common use for cutting English screw threads, the manufacturer states that this is the first known satisfactory design for metric threads. It is now available for 9 in. swing South Bend lathes having metric lead screws, and is being developed for other sizes.

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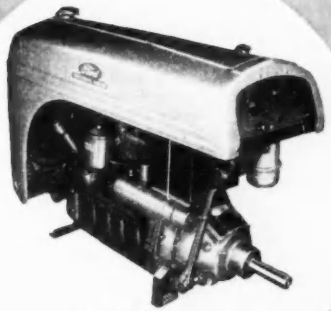

Ford 120 Four Cylinder Industrial Engine Power Unit (120 cu. in. displacement)

Vacuum sweeping principle is used in the "Leaf and Litter Collecting Unit," manufactured by the Good Roads Machinery Corp. of Minerva, Ohio, to remove debris from along street curbs and around drain openings. A Ford 120 four cylinder Industrial Engine Power Unit provides the power for suction blower, shredder and hydraulic body dumping mechanism. Leaf compartment holds 14 cubic yards, is equipped with filters to eliminate dust.

For power, pick Ford! There's a model *just right* for your application in the great Ford Industrial Engine "Power-Family"—a "four" with 120 cu. in. displacement . . . two "sixes"—226 cu. in. and 254 cu. in. displacement . . . two "V-eights"—239 cu. in. and 337 cu. in. Each one completely new, the *right* power for you—for farm implements, construction, standby units, material handling, pumping, many other important uses. Write today for complete specifications.

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PUBLICATIONS AVAILABLE

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D-64 Screw-Thread Standards

National Bureau of Standards—A supplement to Handbook H28 (1944), Screw-Thread Standards for Federal Services is available. It makes effective a number of changes in American screw thread standards which have been adopted by the Interdepartmental Screw Thread Committee of the Federal Government since publication of the 1944 edition. Changes are given for sections of the handbook dealing with American national form of thread; national thread series; screw threads of special diameters, pitches, etc. Also included is an extensive appendix containing descriptive material, charts and tables of unified standards which were the subject of recent signing of an accord for unification of American, British and Canadian systems of screw threads. Copies available from Supt. of Documents, Government Printing Office, Washington 25, D. C., at 25 cents a copy.

D-65 Carbide Blanks

Carboloy Company, Inc.—Tool Catalog Supplement No. 8, listing sizes and prices for its new line of standard blanks for pulley grooving tools and improved, heavy duty, lathe and grinder center blanks, has been issued by the company.

D-66 Buyer's Comparison Chart

Cone Automatic Machine Co.—An eight-page chart has been prepared for use as a suggested memorandum of various facilities of work and tool capacity, support and maintenance, provided by the horizontal type of multiple spindle automatic bar machines.

D-67 Thermalloy HC-250

American Brake Shoe Co., Electro-Alloys Div.—A new six-page bulletin, "How to Reduce Abrasive Wear with Thermalloy HC-250" describes the physical properties of Thermalloy. Case histories of the metal, giving actual field service data in each case, are included and information is given on machining and high temperature service.

D-68 Handbook on Hydraulic Oils

E. F. Houghton & Co.—A revised edition of the Houghton Handbook on Hydraulic Oils is available. A chapter on flushing hydraulic systems has been added. It discusses the different procedures used in flushing of hydraulic systems which have become contaminated, and recommends an improved procedure. Other chapters cover hydraulic oil specifications, additive treatment of hydraulic oils, trouble shooting, etc.

D-69 Spindle Units

Norton Co.—An attractive two-color folder describing and illustrating the Wheel Spindle Unit, is available. Design highlights and features are given and a full page of various types of machines using the Wheel Spindle Unit is included.

D-70 Open Back Inclinable Presses

E. W. Bliss Co.—A new 24-page illustrated catalog gives production advantages and improvements on the complete line of Open Back Inclinable Presses built by the company. An entire section of the catalog has been devoted to the various component parts and accessories, including Meehanite castings, patented Bliss Rolling Key and Friction clutches, slide assembles, connections, bearings, etc.

D-71 Protective Coatings

United Chromium, Inc.—A four-page bulletin on Ucilon Protective Coatings gives information on four groups of coatings expressly developed for corrosion control, chemical resistance and

(*Turn to page* 54, *please*)

***TIME SAVER COUPON** for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.*

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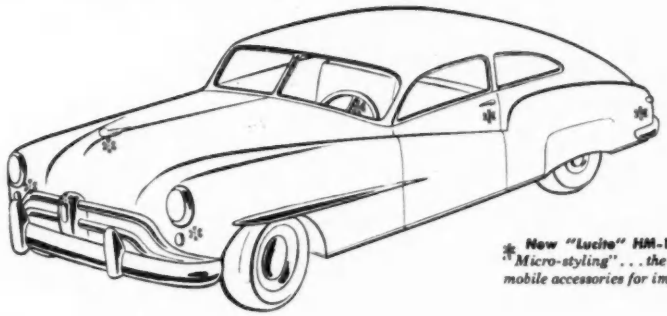
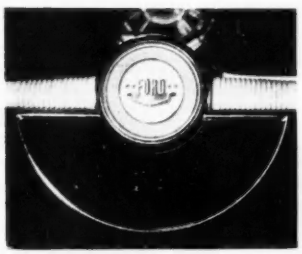
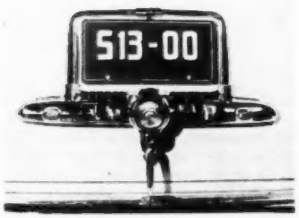


* **New "Lucite" HM-140** *fits right into your plans for "Micro-styling"... the design of small but important automobile accessories for improved appearance and utility.*

Provides added beauty and utility in hood ornaments · horn buttons · lamp lenses · reflectors · medallions · dials



A handsome horn button of sparkling "Lucite" in beautiful three-dimensional colors. Looks smooth . . . is pleasant to the touch . . . on 15 makes of cars using horn buttons of "Lucite." (Horn button molded by Erie Resistor Corp., Erie, Penna.)



Reflectors and lenses of "Lucite" are weather-resistant, non-fading. Reflectors are molded with such accuracy that they reflect beams of headlamps more than a quarter-mile away. (Reflectors for six makes of cars molded by Stimsonite Plastics, Chicago.)

New "Lucite" HM-140 molding powder offers improved features for the automotive industry. It has better molding characteristics and is even more water-white than well-known "Lucite" HM-122.

Since the introduction of "Lucite" in 1937, Du Pont has continued to develop improved acrylic resin compositions for the automotive industry. Today, 19 makes of cars are using 138 parts molded of "Lucite." Here are some of its outstanding advantages:

UNUSUAL VERSATILITY

"Lucite" can be readily molded into an almost unlimited variety of designs. It can be molded and painted to obtain beautiful three-dimensional color effects.

LONG-LASTING COLOR

"Lucite" comes in a wide range of brilliant, colorfast hues. Transparent, translucent, or opaque, it holds its beauty through years of weathering and hard service.

SPARKLING TRANSPARENCY

The light-transmission of "Lucite" is as high as that of finest optical glass. Its remarkable ability to "edge-light" and "pipe" light around corners makes it adaptable for many special effects.

TIME-TESTED DURABILITY

On the assembly line or after years of service under the most rugged conditions, parts made of "Lucite" still retain full beauty and utility. The weather-resistance of "Lucite" is unsurpassed by any transparent plastic. It is light in weight and virtually unbreakable. In normal use, it isn't damaged by gasoline or lubricants, or by many common solvents.

WRITE FOR FURTHER INFORMATION—on "Lucite" HM-140 and other Du Pont plastics. If you wish, Du Pont technical men will be glad to consult with you in confidence and advise on applications of Du Pont plastics to fit your needs. Write to Plastics Dept., E. I. du Pont de Nemours & Co. (Inc.), at the most convenient address: General Motors Bldg., Detroit, Mich.; 350 Fifth Avenue, New York 1, New York; 7 S. Dearborn St., Chicago 3, Ill.

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PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Lincoln-Mercury Div., Ford Motor Co.—The appointment of **George Dixon** as Assistant Parts and Accessories Manager, has been announced.

Studebaker Corp.—**Edwin J. Challinor** has been appointed Assistant to the General Service Manager.

The White Company—**J. C. Wright**, formerly Sales Manager of the Newark Branch, has been made Assistant Wholesale Manager, Cleveland office.

Douglas Aircraft Co., Inc.—**Victor E. Bertrandias** has resigned as Vice-President and Director of Foreign Sales.

Northrop Aircraft, Inc.—**Kenneth P. Bowen** has been named Assistant Vice-President of the company. He will assist in planning and supervising production.

Bohn Aluminum & Brass Corp.—The appointment of **Paul E. Warner** as Sales Manager of the company's metal division, has been announced.

General Electric Co.—**R. E. Burroughs** has been appointed Manager of Engineering of the Aircraft Gas Turbine Div.

Westinghouse Electric Corp.—**R. S. Kersh** has been made Manager of Central Station Sales and **F. D. Weatherholt** appointed Manager of Industrial Sales. The appointment of **G. L. MacLane, Jr.**, as Manager of the Engineering Laboratories, has also been announced.

Borg-Warner Corp.—**Walter M. Reynolds** has been elected Secretary of the Morse Chain Company division.

General Controls Co.—The appointment of **W. E. Conkright** to the position of Sales Promotion and Advertising Manager, has been announced.

Air Reduction Sales Co.—**Frank J. Aschenbrenner** and **Earl C. Clark** has been appointed Assistant Directors of Research and Engineering. **J. K. Hamilton** has been made Manager of Apparatus Research Division, with **H. O. Klinke** as Assistant Manager. **J. T. McKnight** is Superintendent of Production and Services Section and **T. J. Cholis** becomes Supervisor of Patent Section.

Cleveland Graphite Bronze Co.—The election of **Wilbur D. Prescott** as Assistant Treasurer and **Charles A. Dilley** as Assistant Secretary, has been announced.

Necrology

Austin M. Wolf, 58, director of standards of the New York State Division of Standards and Purchases, and well known figure in automobile engineering circles died on Aug. 22 in Plainfield, N. J.

Frank Lewis Klingensmith, 70, automobile industry pioneer and a former top executive of the Ford Motor Co., died on Aug. 28 in Birmingham, Mich.

John William Dunne, 73, British aviation pioneer, died in London on Aug. 24.

Aluminum Co. of America—**A. C. Runnette** has been named Manager of Sand and Permanent-mold Casting Product Sales.

International Harvester Co., Motor Truck Div.—**Carl A. Lindblom** has joined the division as Chief Engineer of its newly established advanced engineering group.

Tung-Sol Lamp Works, Inc. — **H. Merle Darling** has been elected Vice-President and **George E. Hallett** has been elected Controller.

Hamilton Standard Div., United Aircraft Corp. — **Charles M. Kearns** has been appointed Engineering Manager of the division. The promotion of **Raymond P. Lambeck**, as Chief Product Engineer, has also been announced.

Canadair, Ltd.—**William K. Ebell** has been appointed Vice-President in Charge of Engineering. He was formerly associated with the Glenn L. Martin Co.

Fram Corp.—The following appointments to the engineering staff have been announced: **Paul Huber** has been named Research Engineer and **H. G. Kamrath**, Liquid Filter Engineer.

Photoswitch Incorporated — Announcement has been made of the appointment of **Oscar C. Stark** as General Sales Manager.

Publications Available

(*Continued from page* 52)

heavy duty industrial painting. Essential facts on various formulations are briefly outlined.

D-72 Anniversary Booklet

Ex-Cell-O Corp.—The Company's 30th Anniversary booklet, "Ex-Cell-O in the Land of Opportunity" is an attractive volume, printed in three colors and gives a comprehensive picture of Ex-Cell-O facilities, personnel and operations.

D-73 Charts for Seal and Shield Bearings

Waldes Kohinoor, Inc.—A series of charts giving engineering data and specifications for use of Waldes Truarc Inverted Retaining Rings with seal and shield bearings, is available. Specifications include groove diameters and widths and all other pertinent data. A complete set of charts covering Fafnir, Federal, Hoover, New Departure and MRC Seal and Shield Bearings are also available.

D-74 Core Drill Cutters

Scully-Jones & Co.—A new line of high speed steel core drill cutters is discussed in a new folder made available by the company. Description, prices and specifications are covered in a diagram concerning 25 sizes of cutters.

D-75 Pressure Regulators

Air Reduction Sales Co.—A 32-page catalog covering its complete line of pressure regulators includes regulators for welding, cutting, special flame processes, etc. A section is devoted to regulator adapters and pressure gages.

D-76 Variable Speed Control

Reeves Pully Company—A new eight-page bulletin describes the improved design of Reeves Vari-Speed Jr. unit for light horsepower requirements. Included are descriptions, photographs, rating and dimension tables and prices.

D-77 Bonding Resins

Bakelite Corporation—A Technical Data file describing resin binders for sand cores and production economies that can be achieved through their use in foundry operations, is available. It includes technical bulletins on Bakelite urea and phenolic sand core bonding resins for ferrous and non-ferrous metal castings; gives data on properties of resins together with suggestions and procedures for typical core mixes.

OPEN SESAME TO PROFITS

To open the door to wider profit margins today, manufacturers must scrutinize every possible way to lower production costs. The press has proved many, many times in the most diverse industries to be the "open sesame" to more efficient production. Clearing presses have the precision and rigidity that mean lowest maintenance expense and highest effective output.

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THE WAY TO EFFICIENT MASS PRODUCTION

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Generally improved business conditions are indicated. Department store sales, electric power production, railway freight loadings, and construction increased during the week ended Aug. 20, while bituminous coal production declined. The *New York Times* index of activity for the week ended Aug. 20 stands at 143.2, as compared with 141.7 in the preceding week and 150.3 a year ago.

Sales of department stores during the week ended Aug. 20, as reported by the Federal Reserve Board, equaled 251 per cent of the 1935-39 average, as compared with 218 in the week before. Sales were seven per cent below the corresponding distribution a year ago, as against a preceding decline of 15 per cent. The total in 1949 so far reported is five per cent less than the comparable sum in 1948.

Electric power production increased during the week ended Aug. 20. The output was 3.5 per cent above the corresponding amount in 1948, as compared with a similar advance of 4.0 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 731,215 cars, 0.4 per cent more than the figure for the week before but 18.8 per cent below the corresponding number recorded in 1948.

Crude oil production in the week ended Aug. 20 averaged 4,722,900 bbl daily, 798,400 under the comparable output in 1948.

Production of bituminous coal and lignite during the same week is estimated at 7,550,000 net tons, 450,000 less than the output in the week before and 4,837,000 below the corresponding quantity in 1948.

Civil engineering construction volume reported for the week ended Aug. 25, according to *Engineering News-Record*, was $147,684,000, or eight per cent more than the preceding weekly figure and 55 per cent above the comparable sum in 1948. The total recorded for 34 weeks of this year was 20 per cent more than the corresponding amount in 1948. Private construction for the period was 16 per cent above that a year ago, and public construction increased by 23 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended Aug. 23, at 151.9 per cent of the 1926 average, showed no variation from the preceding week but was 10.5 per cent below the corresponding figure in 1948.

Member bank reserve balances decreased $587 million during the week ended Aug. 24. Underlying changes thus reflected include a decline of $613 million in Reserve bank credit and increases of $41 million in Treasury deposits with Federal Reserve banks and $8 million in Treasury cash.

Total loans and investments of reporting member banks increased $486 million during the week ended Aug. 17. An advance of $33 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, $12,939 million, shows a net decrease of $1933 million in 12 months.

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Today—when every manufacturer is seeking shortcuts in production and additional economies that will permit an equitable price reduction, many small shops and large factories are turning to welded steel tubing as the low-cost solution to their fabricating problems.

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OBSERVATIONS

By JOSEPH GESCHELIN

Machinery Exhibits

Recent machine tool show held in Springfield, Vt., under the sponsorship of the four machine tool builders there turned out to be an impressive success. It was more than just a display of new equipment; it stressed bright new developments of interest to production executives (AUTOMOTIVE INDUSTRIES, July 15, 1949). The success of this venture raises the natural question—Why not other regional machine tool shows in major centers such as Rockford, Cincinnati, and Cleveland?

How Much

How much—how quickly? This query may well apply to the depreciation of machine tools. From spot checks made by this writer on various occasions it is evident that depreciation policies still lag behind management advances in other directions. In certain specific cases there are good reasons why a company prefers to take the long count. But in the main depreciation rates are out of date, out of step, and represent a link with the past. Perhaps the most important point to consider is the effect of obsolescence. No competitive manufacturer can afford to run machinery to its useful span of life. Improvements in techniques occur so rapidly as to obsolete existing equipment long before its useful service life has been approached. Yet to continue with the older machine may mean being priced out of business. The only answer is to take depreciation faster than before. To do this effectively implies a change in Treasury policy long overdue.

Transfer Machines

There is no question that the transfer machine, as a type, is sweeping the industry. Many master mechanics have adopted transfer machines with some reservations because of the maintenance problem and the likelihood that an entire line must go down in the event of even minor trouble at any station or part of a station. Master mechanics who are pursuing this development currently tell us that the answer to maintenance is being found in the natural improvement of new equipment. For example, they are getting the cooperation of machine tool builders in making all control elements readily accessible, in locating hydraulic and electrical elements accessibly, and in short redesigning for easy accessibility all around. Again it is an example of evolution from a dramatic beginning.

Hydraulic Booster

Recently we drove a car equipped with a unique hydraulic brake booster which uses fluid pressure from the hydraulic system of an automatic transmission. Pedal pressure is surprisingly light and gentle with pedal movement considerably less than standard. Major features of the device are its quick responsiveness and unusual controlability for fast stops. It is being shown to a number of motor car builders at the present time.

Quality Control

To the growing list of automotive manufacturers who have adopted the quality control charting technique can be added the Fuller Mfg. Co., Kalamazoo, Mich., one of the major producers of transmissions for heavy duty vehicles. Control charts are in experimental use in the gear department for checking hobbed gears. From the start the method has proved eminently successful in determining evidence of lack of control, making it possible to trace the trouble to the machine or the operator. Eventually the technique will be extended to include most operations.

Reo Gold Comet Engine

(*Continued from page* 41)

end. Since center in the pin end of the rod is one of the major locating points as well as functional in character, the oil hole and countersink are carefully produced in a No. 201¼ Barnesdril unit with a three-station indexing fixture, handling two rods at a time. The hole is drilled at one station; countersunk 120 deg by 11/16 in. at the other.

A Kingsbury multiple-head drilling machine, having five stations is set up for milling the bearing lock notch in the rod and cap, and drilling the oil spurt hole in the rod.

Next major operation is grinding of the joint face of the rod and cap in a Hanchett rotary surface grinder. It has a ten-station indexing fixture, holding five pairs of rods and caps.

At this stage the rods and caps are prepared in matched pairs by drilling and semi-finish reaming two holes; and drilling and finish-reaming two holes. This is done in a special Cross five station rotary drilling machine. Both ends of the bolt holes are countersunk in the rod and cap and the parts are assembled together with bolts and nuts.

From this point on the rod and cap assembly is handled as a unit and goes to another of the Hanchett grinders to finish grind both sides of the crank end. Similarly the crank bore is semi-finish bored and both sides chamfered to correct the bore of the assembly, in a heavy duty No. 17 Baker drill. Then follow some detail operations, and the assembly and burnishing of the piston pin bushing.

The piston pin hole and crank bore are precision-bored in a three-station Heald Model 321 precision boring machine. Interesting feature of this setup is the arrangement of tooling for the pin bore. To produce a finish-bored hole, the tool is designed to rough-bore coming in, then finish-bore on the return stroke.

The crank end bore is honed to size in a two-spindle, Micromatic Microsize Hydrohoner, fitted with a fixture holding two rods at a time. It maintains the bore with a tolerance of 0.0001 in. for out-of-round and straightness; and 0.0005 in. on the diameter. To assure such fine tolerances, the machine is provided with a Frostrode refrigerator unit for maintaining the temperature of the coolant at a fixed constant setting.

The last major operation is that of balancing the rod in a specially designed Snyder machine. Weight is removed for balancing by milling the lug on the cap and by hollow milling both sides of the piston pin end. This requires two hollow mills and a solid body, carbide-tipped side milling cutter in the three-way machine. To perform the operation, the operator weighs both ends on a Shadograph scale, notes the key to the calibration on the Snyder machine, then sets the scale on the balancing machine. The machine removes the metal automatically in accordance with the scale setting. At the end of the operation the rod is weighed again as a recheck. Final inspection then follows, the crank bore being checked for size with the familiar P & W Air-O-Limit gage.

The crankshaft machine line too is entirely new, featuring a battery of the latest types of automatic crankshaft lathes produced by LeBlond. For initial turning, drive lugs are milled in the forging in two special Kearney & Trecker Simplex rise and fall milling machines. The first machine mills lugs on the No. 1 and No. 12 cheeks; the

(*Turn to page* 86, *please*)

demand this Guarantee OF EXCELLENCE on Factory Reconditioned Air Brake Equipment


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AUTOMOTIVE AIR BRAKE CO.
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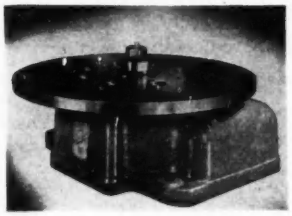
NEW ★ PRODUCTS

For additional information please use coupon on page 52

F-59—Electric Indexing Fixture

Accurate and rapid indexing of work pieces is possible with the Ettco-Emrick No. 97 electric indexing fixture developed by the Ettco Tool Co., Inc., Brooklyn, N. Y., to be used for punch press, tapping machine, drill press and similar operations.



Ettco-Emrick electric indexing fixture, No. 97

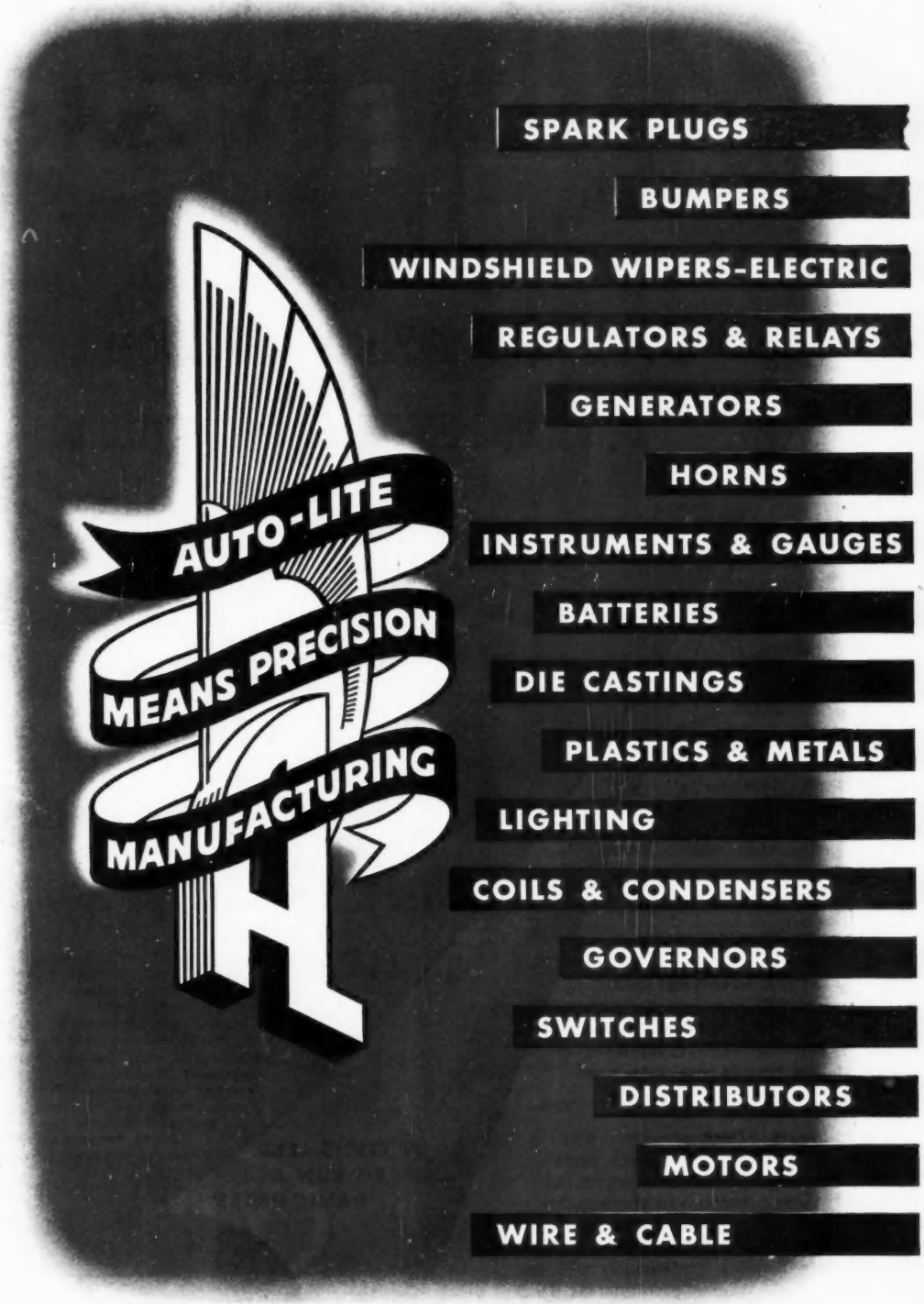
Table indexing motions are controlled electrically through a modified geneva system to assure smooth, shockless action. At each indexing station the table is accurately locked in place by a hardened locating pin. A built-in electric control automatically synchronizes the movement of the spindle and the table and also controls downward motion of the spindle. The No. 97 indexing unit is available with a choice of interchangeable indexing plates ranging in size from ten to fourteen inches in diam.

F-60—Acid-Type Cleaning Compound

Development of an acid-type cleaning and surface-conditioning material, Oakite Compound No. 33, for removing rust, oxides, grease, oils and shop soils from metal surfaces, and for preparing ferrous metals and aluminum for sure-grip adhesion of paint, lacquer and enamel finishes, is announced by Oakite Products, Inc., New York, N. Y.

Oakite Compound No. 33 may be

(*Turn to page 64, please*)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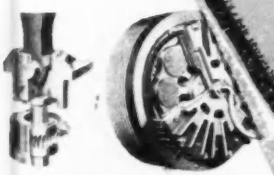
DANLY PRESSES

1. new design features
2. extra rugged construction
3. record-breaking performance

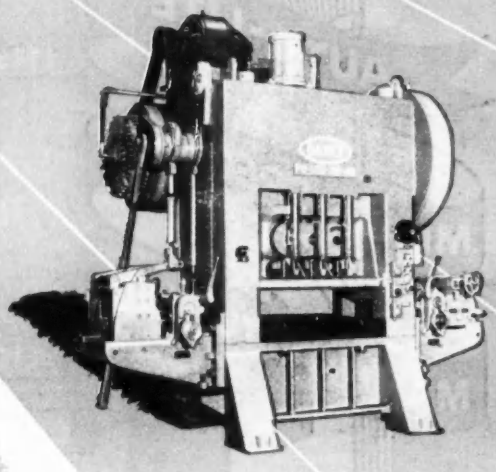


LEFT—Cut-away view of special Danly pitman wrist pin design showing guide construction. RIGHT—Cut-away view of Danly Clutch showing long wearing, easily replaced friction discs.

1. **New Design Features . . .** Press engineering achievements like the Danly "low inertia" clutch, positive automatic lubrication, special pitman wrist pin design and sensitive electrical controls assure ease, economy and continuity of operation.

2. **Extra Rugged Construction . . .** Special structural features like the extra heavy stress relieved frame weldments, oversized tie-rods and bronze lined, fully adjustable gibs make every Danly Press more rugged . . . to withstand the continual abuse of 24 hour, 7 day week operation.

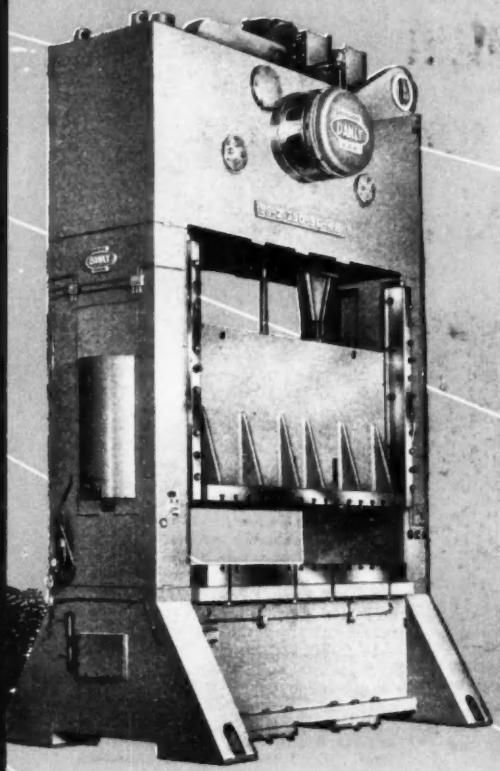
3. **Record-breaking Performance . . .** The exclusive Danly "low inertia" clutch alone minimizes the most troublesome source of press maintenance cost and work stoppage because it out-wears conventional type press clutches 10 to 1! A greater proportion of the clutch assembly mass revolves continuously with the flywheel to reduce the clutch "pick-up" load. Thus, less heat is generated. Forced air circulation contributes further to cool operation.

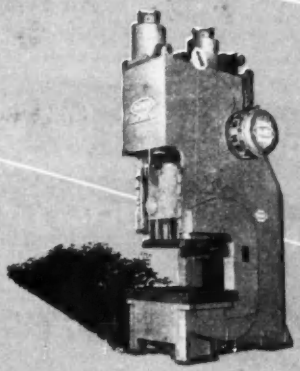


THE NEW AUTOFEED . . . Uninterrupted high volume production is a must in the large electrical manufacturing plant where this newly designed press is in operation. Higher capacity in both tonnage and speed, with fully automatic stock feeding, makes this the truly modern press for high speed production stamping. Costly press downtime is greatly reduced because of substantially greater frame rigidity which reduces vibration at higher operating speeds. For this reason your dies last longer between grinds. Available from 50 to 800 tons in extra heavy construction.

"IT COSTS LESS TO RUN A DANLY PRESS"

are better 3 ways!





GAP FRAME . . . This 200 ton Danly Gap Frame press shows how modern eccentric gear construction permits a compact closely coupled drive. As a result, drive members are more rigid and wear longer. Other types include inclinable presses, underdrive presses, and special welding presses Whatever your mechanical press requirements, you can have the advantages of the exclusive Danly construction and engineering features.

STRAIGHT SIDE . . . This new single action press was recently installed in a leading automotive manufacturing plant to help reduce stamping costs. Presses are available from 50 to 3000 tons with one, two or four point suspension and single, double or triple action. All of the special Danly features . . . plus engineering to meet your press requirements . . . assure you that a Danly Press will do your job faster and more efficiently.

Check these advantages and see how DANLY PRESSES can cut your production costs.

- greater rigidity . . . the entire frame is constructed to minimize deflection and vibration at rated capacity.
- less downtime . . . positive lubrication, longer clutch life and increased accessibility of brake and clutch components subject to wear are only a few of the features that make Danly Press maintenance less frequent and less costly!
- precision construction . . . balanced rotating parts and precision machined guides reduce wear and assure accurate die closure.
- extra sensitive controls . . . special five position clutch controls with built-in safety features facilitate die tryouts and protect the press mechanism.

We will be glad to arrange a detailed discussion of the savings DANLY PRESSES can achieve in your specific application. Write today!

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NEW PRODUCTS

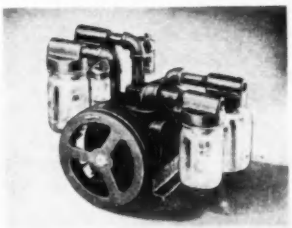
For additional information please use coupon on page 82

(*Continued from page 60*)

used for prepaint cleaning of large steel or aluminum parts or sheets by wipe-on-method. Dilute solutions are applied at room temperature by brush or cloth, allowed to soak on surfaces briefly, then followed by rinsing and hand-wiping. For washing medium-size or small parts, the solutions may be employed in tanks or in acid-resistant washing machines at working temperatures approximately 140 F. Water rinsing and quick drying complete the cleaning-conditioning cycle. Where light rust is the principal soil on steel parts being processed, use of the compound may eliminate need for separate pickling and rinsing operations.

F-61—Rotary-Vane Air Pumps

Engineered for automatic feeding operations, three new rotary-vane air pumps are available for original equipment applications from Gast Mfg. Corp., Benton Harbor, Mich.



Gast rotary-vane air pumps

By producing a moderate degree of vacuum and air pressure with comparatively large air volume per horsepower, they meet requirements for feeding paper, cardboard, light metal or plastic materials on printing presses, folding and packaging machines, punch presses, etc. The rotary-vane design runs quietly and produces a positive, pulseless air delivery.

The dual chamber models deliver air pressure on one side and vacuum on the other, thereby increasing efficiency and performance and simplifying installation, according to the manufacturer. All three models are equipped with ball bearings and V-belt pulley with integra fan for cooling and drive. Intake and outlet filters, visible oilers and other accessories are available.

The small dual pump, Model 10x1040, delivers 9 cfm from each chamber at 1200 rpm. Either or both chambers produce vacuum to 20 in. or pressure to 20 psi. Similar in outside appearance to the smaller model, shown here, the large dual pump delivers 14 cfm from pressure chamber and 9 cfm from vacuum chamber. Up to 15 psi pressure and 15 in. vacuum is developed. By connecting the pressure (exhaust) port of the vacuum chamber to the pressure line, increased air blast is obtained. The new Model 3040 single chamber pump produces moderate pressure or vacuum with volume of 19 to 24 cfm depending on rpm.

F-62—Elastic Drift Measuring Machine

Development of jet engines and other powerful rotating machinery has

(*Turn to page 68, please*)

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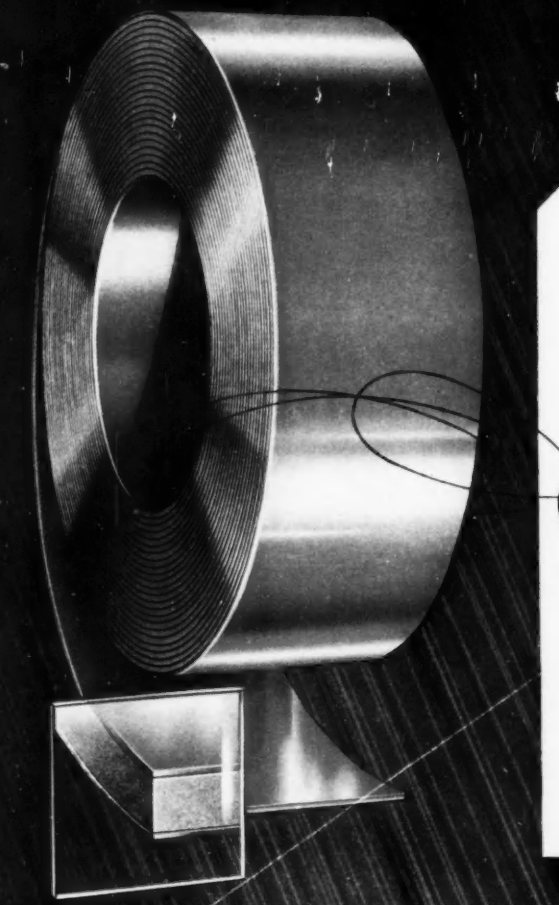

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If you don't use the "inside" of the gauge thickness in your applications for expensive-metals strip, have the core of plain steel—and save money! With SuVeneer Clad Metals, you get the dense, solid surface of stainless, copper, nickel or monel, bonded inseparably to low carbon strip steel on one or both sides. You get the *performance* you need, at lower cost. ● *Write for the detailed facts.*

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CARNEGIE, PENNSYLVANIA

Electrical connector molded from Hycar rubber by Mines Equipment Company, St. Louis, Missouri.

It handles "HOT JUICE" for planes—SAFELY

YOU'VE often seen air liners getting under way at an airport. A serviceman brings out a portable electric generator, plugs it in, gets the plane's huge engines going.

The plug that connects the electricity to the plane has a vital part in this job. And the plug pictured above *more* than meets the tough service requirements. It's made of Hycar OR-25 EP (easy processing), a special oil-resistant American rubber with outstanding advantages.

Hycar OR-25 EP resists heat generated by current, stays flexible at high temperatures. It resists oxidation, aging, weather and wear. Most important—it resists abrasion and chipping, and neither oil nor grease will harm it.

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American Rubber

Important production economies, such as shorter mixing cycles, are made possible by the superior processing characteristics of Hycar OR-25 EP. Find out the many ways that versatile Hycar may be used to help build your sales and profits. For complete information, please write Dept. HC-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

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A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

Automatic Transmissions

(*Continued from page* 31)

From this is can be seen that to shift from first to second it is necessary to release the front-unit friction band and engage the front-unit clutch; to shift from second to third it is necessary to apply the front unit and release the rear-unit friction band, and also to disengage the front-unit and engage the rear-unit clutch, while to shift from third to fourth it is necessary to release the front-unit band and engage the front-unit clutch. Each downshift requires the inverse of these operations.

The hydraulic pressure which actuates the gear-shifting mechanism is produced by two pumps of the type comprising a spur gear meshing with an internal gear. Two pumps are required because the shifting mechanism must be operable both when the engine is running and the car at a standstill, and when the car is running and the engine stalled. Both pumps are built into the transmission, the engine-driven one being located at the forward end, while that driven by the car is near the rear end and mounted on a cross shaft which also drives the governor or centrifugal valve. The engine-driven pump, which is the larger, quickly develops the pressure necessary for the control of the transmission after the engine has been started.

Application and release of the friction bands are accomplished by what are referred to as servos. These are cylinders containing pistons which are acted upon by both hydraulic pressure and coil springs. The one for the front unit is arranged vertically alongside of it, while that for the rear unit is horizontal and located below the unit at the bottom of the housing. The clutches are engaged by means of annular pistons and disengaged by springs.

It is not the intention to describe the hydraulic control system in detail, as it is rather complicated and such a description would require too much space. However, the general principles on which the system operates will be outlined.

Admission of the hydraulic fluid to the clutch pistons and the friction-band servo is controlled by a balanced control valve which is subjected to the pressure of a coil spring and to two hydraulic pressures, of which one is controlled by the speed of the car and the other by the position of the accelerator pedal. The proper moment for either an upshift or a downshift depends on the speed of the car, but if the automatic feature is to be practical the driver must be able to modify its action, or to overrule it. The car speed acts on the hydraulic pressure in the control valve by means of a rotating centrifugal valve, while the driver acts on the hydraulic pressure at the other end of the control valve by means of the accelerator pedal. The general arrangement of the hydraulic system is shown in Fig. 4. The centrifugal valve, which rotates at a speed proportional to that of the car, has a radial plunger which is being forced inward by regulated pressure from the main line (80 psi) and outward by the centrifugal force on it. Actually there are two centrifugal valves, fitted coaxially in the same housing. One of them carries a rather heavy centrifugal mass, which regulates hydraulic pressure at speeds below 1300 rpm, while the other carries a lighter mass and regulates to 3000 rpm. The revolving valve has a cylindrical extension which has a bearing in a governor sleeve, from which tubular connections are made to the control valves. Oil from the centrifugal valve, which opens at a relatively low speed, plays a part in making all upshifts, while that from the high-speed valve is effective only during shifts from second to third and from third to fourth speed.

Referring to Fig. 4, oil from the main hydraulic line also enters the

(*Turn to page* 80, *please*)

NEW PRODUCTS

For additional information please use coupon on page 52

(Continued from page 64)

brought need for the new "twist detector" of the Westinghouse Electric Corp., Pittsburgh, Pa. Technically known as an elastic drift measuring machine this device can detect changes in weight as small as one part in 100,000 and can measure less than one-millionth-of-an-inch twist in a steel bar.

The "twist detector" consists of a steel shaft 25 inches long and one-inch thick, bolted to the center of a cross-arm at one end and also bolted securely at the other end which is to remain immobile. When weights are placed on one end of the cross-arm, the steel shaft is twisted by an amount that is proportional to the weight. With the aid of sensitive electrical contacts any movement at the surface of the shaft of less than one-millionth-of-an-inch can be detected. As each weight is added, the shaft twists a definite amount more. This is measured in terms of the distance a minutely calibrated gage must move in order to close the electrical contacts again. The weights are next removed in the same succession and the twist of the shaft measured in the reverse direction.

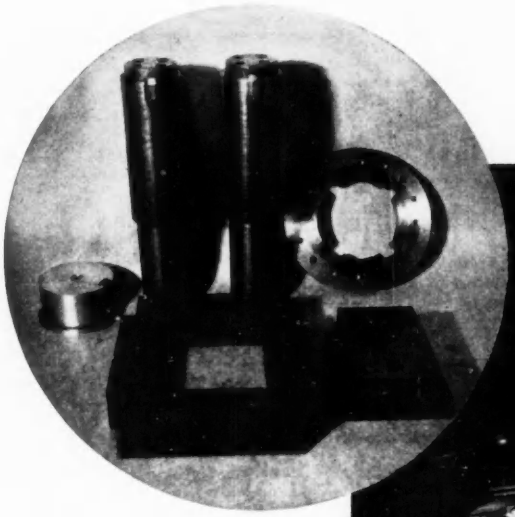
Although an ideal shaft should show the same amount of twist for each weight in both directions, in practice there is a tiny variation between the "up" stage and "down" stage, due mainly to what scientists call "elastic drift."

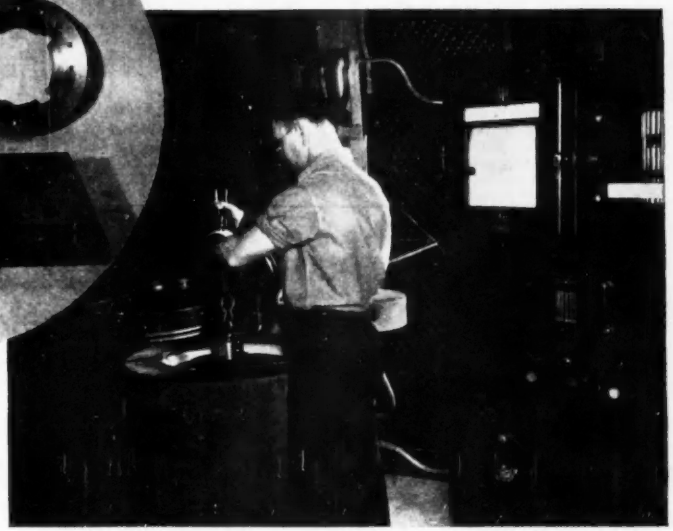
F-63—Three-Way Air Valves

Three-way air valves, FT-102 and FC-102, are new additions to the "fingertip" type of three-way air valves put out by Mead Specialties Co., Chicago, Ill., and now providing an "On" or normally open companion to the "Off" models announced last December. The FT-102 valve has $\frac{3}{8}$ in. pipe thread apertures for quick response when used with air cylinders up to 6 in. bore, and operates by a very light touch on the handle-lever button. The FC-102 is the

(Turn to page 70, please)

Mead three-way air valves. Models FT-102 and FC-102





Various parts such as the round punches, forming dies and reamer bars shown above are heat treated in the L&N Vapocarb-Hump furnace shown at right.

TOOLING UP?

Vapocarb-Hump method helps harden . . . accurately

About six years ago, Reliance Electric & Engineering Co., of Cleveland, Ohio, decided to install their own heat treating department. This was done to assure greater control over the production of punching dies and machine tools. Naturally, they wanted to obtain fast, quality, uniform production . . . production their heat treaters could duplicate at any time. As a result of these requirements, Reliance chose L&N's Vapocarb-Hump method for hardening as the equipment that would best meet their needs.

Dies are used for making rotor and stator laminations of electric motors. A wide variety of steels are employed, ranging from minimum shrink die steel to open hearth types. Quench may be by water, oil, or a light fan blast.

Reliance Electric has been operating its Vapocarb-Hump equipment for 16 hours a day since it was installed. During that time, the method has provided continuous, dependable production. In addition, tool distortion has been practically eliminated. For example, in a typical armature die, made of oil hardening steel, symmetrical, with an 8″ OD and 5″ ID, dimensional changes are held to only 0.0015″.

The Vapocarb-Hump method is a completely integrated process for hardening. With this equipment, all of the factors affecting the hardening are under the control of the heat treater at all times. This means that the heat treater can regulate the furnace atmosphere, the rate of heating, and the quench. Since these controlling factors can be duplicated time and time again, the result is consistent, predictable, quality work.

We will be glad to supply further information about this reliable, time tested, heat treating method. Just write to Leeds & Northrup Co., 4966 Stenton Avenue, Philadelphia 44, Pennsylvania.

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NEW PRODUCTS

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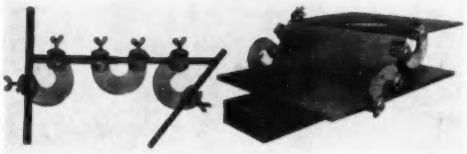
Bernard protractor welding clamps called Pro-Clamps, shown in use.



(*Continued from page* 68)

same valve without the lever, for operation by means of a suitably located cam or trigger on the working machine.

Both models have mounting holes at top and sides to facilitate attachment to any machine. Of the poppet type, there are no sliding closures to wear out. Hose nipples to take ⅝ in. I.D. and up to ¾ in. O.D. air hose are included.

F-64—Protractor Welding Clamp

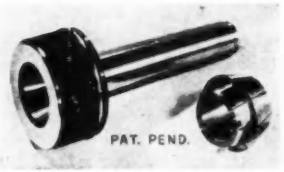
Offered by Bernard Welding Equipment Co., Chicago, Ill., is a protractor welding clamp, called Pro-Clamp, which holds plates, bars, tubing, etc., while the parts are being united by welding, brazing or soldering. By the use of Pro-clamps, piping systems and weldments can be completely installed and assembled before the first weld is applied, often eliminating special fixtures and templates, tack welding, and hand held operations, as well as stand-around time.

The clamps consist of a U-shaped frame at the end of which two clamps are provided for gripping the parts to be held in place for welding. Clamps are rotatably mounted and can be preset at any angle from 0 to 180 deg. The frame of the tool is inscribed with two accurate protractor scales for exact setting at any angle. Clamps may be tightly locked at the pre-set angle.

Pro-Clamps are constructed of light weight high strength alloy, which resists weld spatter. The present model accommodates thickness and diameter from 0 to 1 in. Overall dimensions are 5½ by 8 in.; weight, 3 lbs.

F-65—Centerless Shaft Support Chuck

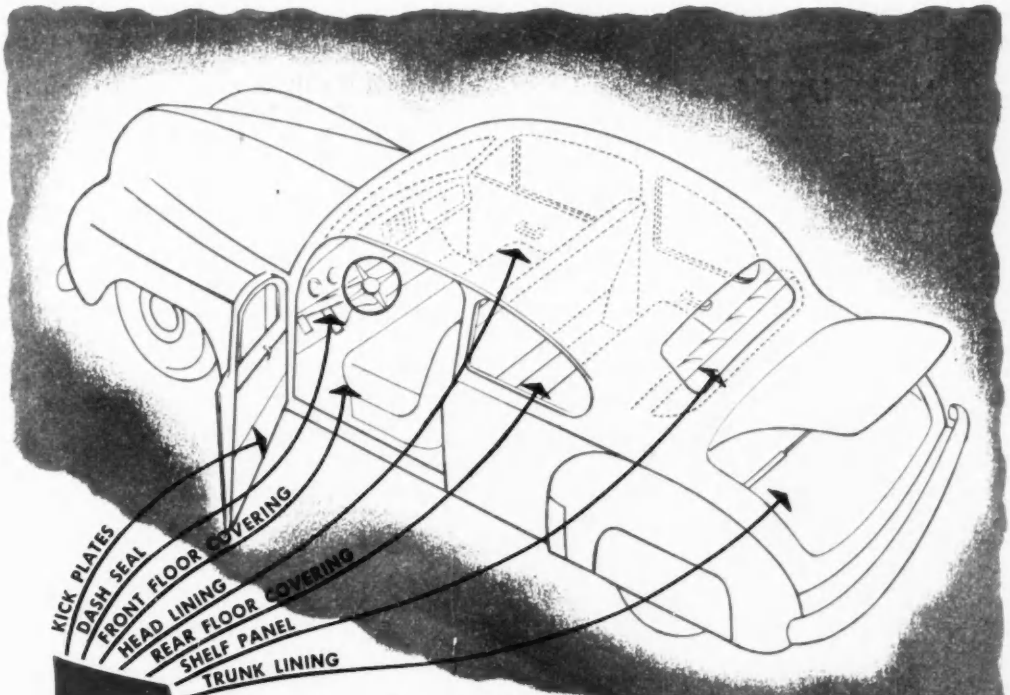
For use in supporting centerless shafts concentrically in the lathe, a simple inexpensive device is presented by the South Bend Lathe Works, South Bend, Ind., known as the adjustable collet bushing chuck. The chuck permits easy and accurate centering in the lathe of motor or generator armatures having shafts ¼ in. to 1 in. in dia. Such shafts usually do not have center



South Bend centerless shaft support chuck

holes and cannot be easily or accurately center drilled. The adjustable collet bushing is manufactured with No. 2 or No. 3 Morse taper shanks for use in

(*Turn to page* 72, *please*)



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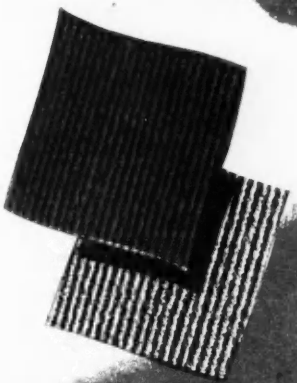
the stylish simulated rib effect of real carpeting . . . the sound-absorbing, sound-deadening feature . . . the long-wearing quality . . . the resistance to common solvents . . . and the ease at which the car can be "cleaned out" by simply washing the material.



Above are typical attractive colors now in production.

Bur-Tex

Burlington Mills Incorporated

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NEW PRODUCTS

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(*Continued from page 70*)

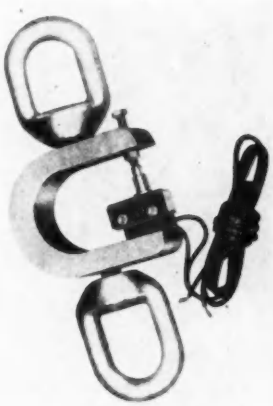
either the headstock spindle or the tailstock spindle of the lathe. Brass collet chucks can be supplied for round stock in sizes from ¼ in. to 1 in. by 16ths. A special size collet of 0.637 round capacity is available for chucking popular types of automobile generator armatures having shafts of this size.

The adjustable collet bushing chuck, when used in the lathe headstock, may be adjusted to drive the work or, when used in the lathe tailstock, may be adjusted for an accurate running fit.

F-66—Crane Overload Limit Switch

Improved Dillon Dyna-Switch of W. C. Dillon & Co., Inc., Chicago, Ill., used to protect hoists or cranes from accidental overloads, embodies heavier bar construction, higher capacity micro-switch, and larger higher-rated eyebolts.

The switch slips onto the hoist or crane hook, and the load is lifted directly beneath it in the usual fashion. The "U" shaped tool steel bar of the switch opens and closes the circuit of



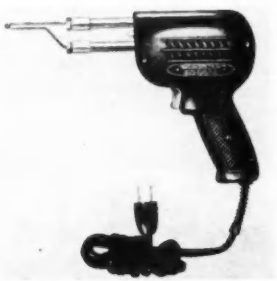
Improved Dillon Dyna-Switch

a micro-switch as loads are lifted. Normally, the circuit of the switch is always closed when loads are being lifted. If the hoist capacity is exceeded, the circuit automatically opens cutting out the motor and preventing the operator from making the lift. The circuit remains open until the operator presses the switch to reverse. He must then remove the excess load before the hoist will pick up. Hoist motors up to ¾ hp can be handled directly by the Dyna-Switch, while all higher capacities are worked through an intermediate relay.

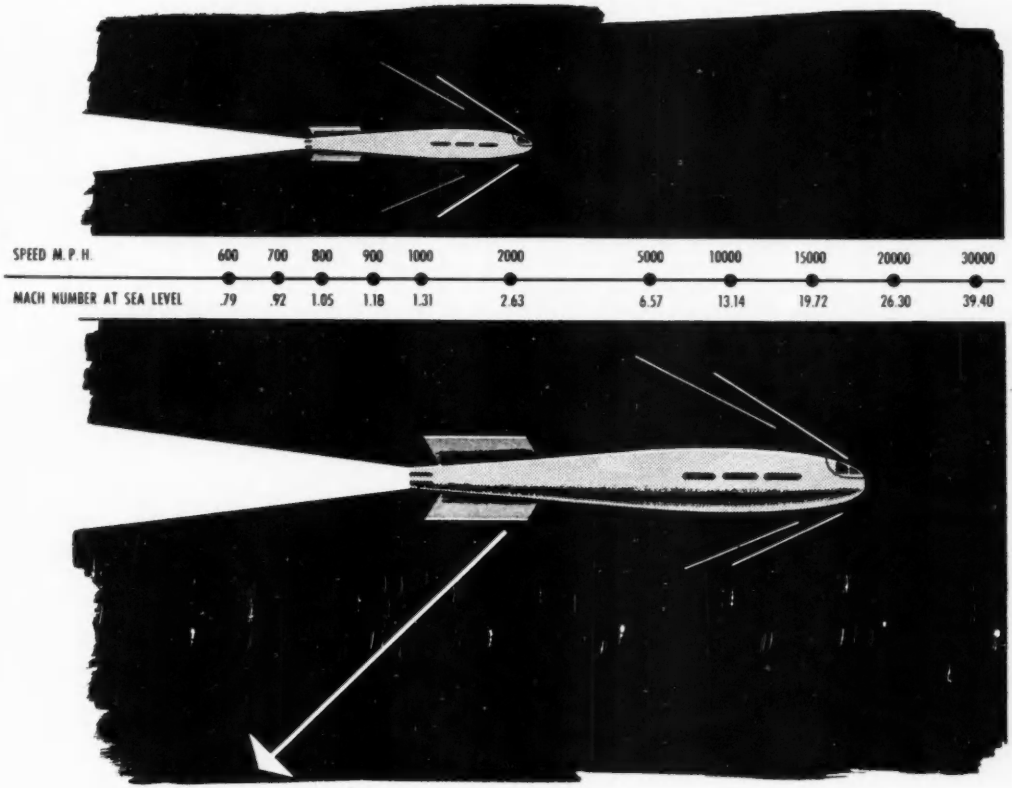
F-67—Heavy Duty Soldering Gun

New model soldering gun capable of handling 250 watts has been developed

(*Turn to page 76, please*)



Weller heavy-duty soldering gun, Model WD-250



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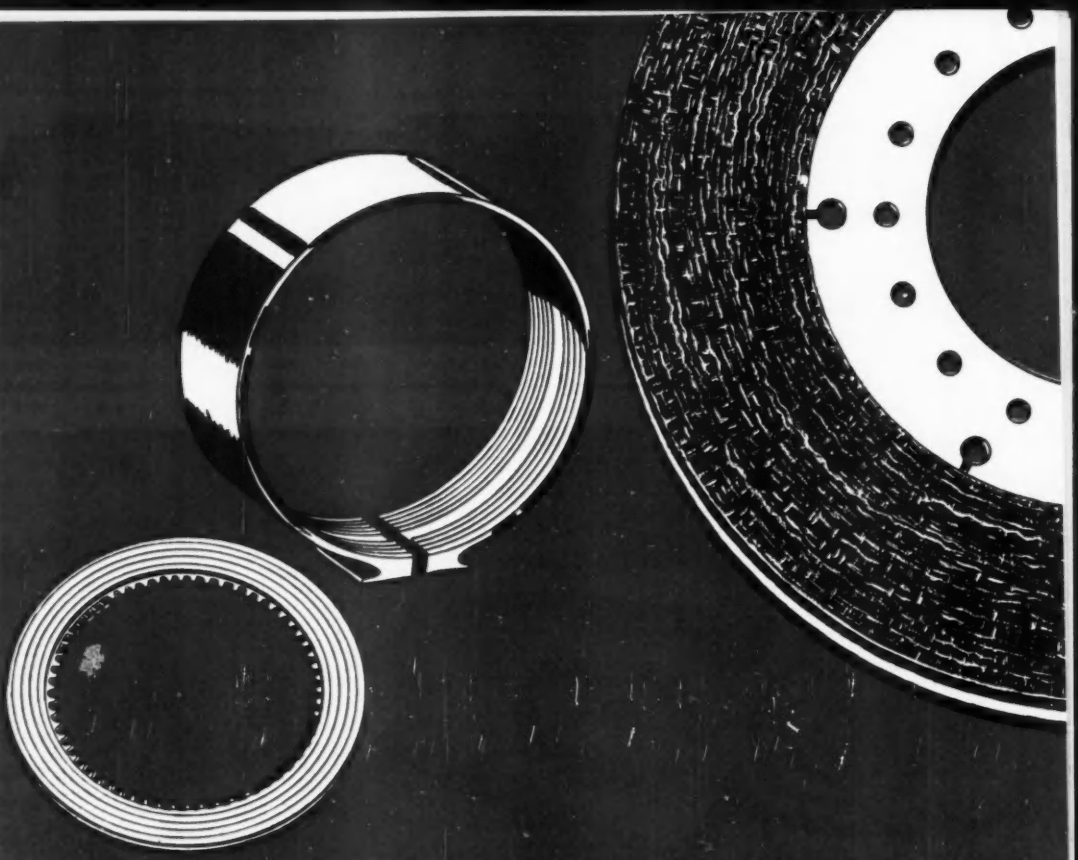
Turbo-jets, ram jets, rockets traveling through space at inconceivable speeds . . . herald the advent of even greater speeds by even greater engines . . . even finer planes now on designers' drawing boards.

In the development of these new planes, SKF continues to work in co-operative progress with the Aviation Industry to provide ball and roller bearings that can withstand the punishment of super speeds and super temperatures. SKF Industries, Inc., Philadelphia 32, Pa. 6574

Aviation bearings engineered by SKF



HOW TO SAVE A BIG STEP ON SUB-ASSEMBLY LINES

Whatever your problems in brake or clutch assembly, you'll find the R/M representative a good man to consult. In many cases, he is able to make suggestions that save steps and save time in assembly operations.

Here's an interesting example. Where specifications call for a friction material bonded to a metal backing . . . a development with which you may not yet be familiar . . . R/M can supply the *completed* sub-assembly, finished to your special needs. You thus eliminate a purchasing operation, as well as several steps in fabrication and assembly!

If it is more practical for you to provide your own backing plate for bonding to the friction component, R/M will, without cost, provide manpower for instruction in the bonding process. The "know-how" is yours for the asking!

For further information, check with your R/M representative. At his call, ready to serve you, are four plants, four research staffs, and four complete testing laboratories . . . with a half-century's experience in brake and clutch applications.

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FIRST IN FRICTION

NEW PRODUCTS

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(*Continued from page 72*)

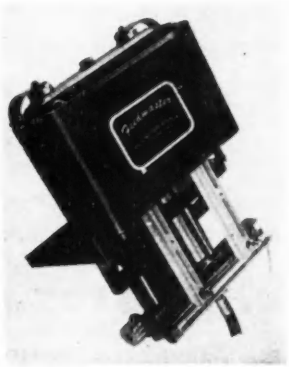
especially for automotive servicing by Weller Mfg. Co., Easton, Pa. This new gun greatly exceeds the previous 135 watt limit for such tools.

Designated model WD-250, the gun handles every type soldering encountered in electrical circuits, including generator commutator work. Fast five second dual heat, prefocused spotlight and new rigid-tip are features. Improved tip design provides more copper in chisel-shaped head with basic structure giving a bracing action—both advantageous in heavier soldering.

Streamlined, lightweight design has terminals in an "over and under" position for greater accessibility to tight spots such as under dash, and increased visibility with built-in spotlight.

F-68—Automatic Feeding Device

An automatic feeding device for use on punch presses, drill presses, spot welders and other tools requiring increment feeding is being manufactured by Great Western Tools, Inc., Burbank, Calif. Known as the Feedmaster automatic air feed, the tool feeds all types



Great Western automatic feeding device, the Feedmaster

of stock up to 8 in. in width, and, with an attachment, handles up to 15 in. in width. Stock can be almost any shape from ¼ in. thick to paper-thin sheets, coiled and strip material, rounds, bars, channels, tees, extruded shapes, etc.

Two pneumatic gripper bars actuate

(*Turn to page 78, please*)

SEE HOW *Pre-assembly* REDUCES PRODUCTION COSTS

Standard Round Head,
External Washer
SEMS-by-SHAKEPROOF

SEND FOR THIS FREE SAMPLE KIT!

Test SEMS-by-SHAKEPROOF on your own assembly . . . check the many advantages that this modern fastener unit provides!

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FASTENING HEADQUARTERS
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Here's what SEMS-by-SHAKEPROOF will do for you: eliminate separate lock washer handling completely . . . prevent lost lock washers or shortages that cause costly delays . . . assure tight, vibration protected fastenings. You get maximum vibration protection because each lock washer is automatically positioned for greater locking power, pulled closer under the screw head for maximum locking tooth engagement.

And, for even greater economies through *pre-assembly*, Shakeproof engineers have developed hundreds of special SEMS-by-SHAKEPROOF combinations for specific applications. The typical example shown at left replaces three separate pieces . . . a screw, a lock washer and a spanner washer . . . and provides a better, more economical fastening! Send for your free SEMS-by-SHAKEPROOF sample kit today! See how these modern, *pre-assembled* fastener units will reduce your production costs!

SHAKEPROOF inc., Division of Illinois Tool Works, 2501 North Keeler Avenue, Chicago 39, Illinois. In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario.

SEMS
-by-SHAKEPROOF

NEW PRODUCTS

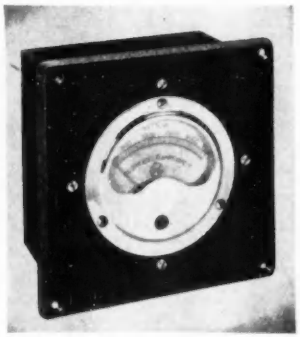
For additional information please use coupon on page 52

(*Continued from page 76*)

the stock. The feed head, driven by an air cylinder, and the stationary hold head, alternate in operation, feeding stock to an accuracy of 0.001 in. over any portion of a 6 in. stroke. The stroke is adjustable during operation and since it is almost instantaneous, can be multi-tripped several times per ram cycle, increasing the total feed length. The Feedmaster, functions with or without die guides or stops, permitting use with plain, compound or progressive dies. Although nominal thickness capacity of the grippers is ¼ in. for flat stock, special shapes such as angles, tees, extrusions, etc., can be accommodated by machining the grippers and by increasing their respective separation.

The air cylinder is controlled by an attached valve actuated by a flexible shaft and cam. The cam is driven off the punch press crankshaft or other source and can be furnished for either single or multi-tripping of the air valve. Intermittent feeding is accomplished with a foot or mechanical trip in conjunction with the standard machine trip. Since feeding is practically instantaneous, the entire usable ram down stroke can be gainfully employed for deep drawing and forming operations.

F-69—High Temperature Indicator

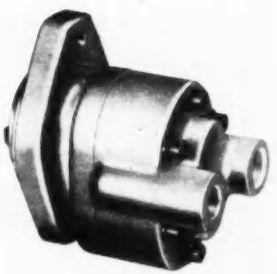


High temperature indicator for general non-critical use, known as Model XA-100 Xactemp thermocouple indicator, announced by the Claud S. Gordon Co., Chicago, Ill. Claimed accurate within a fraction of a scale division, it is calibrated for either Iron-Constantan or Chromel-Alumel thermocouples, with choice of several scale ranges. Indicator is furnished in a metal case for flush or surface mounting, with plug-in type lead-wire connection.

F-70—Rotary Gear Hydraulic Pump

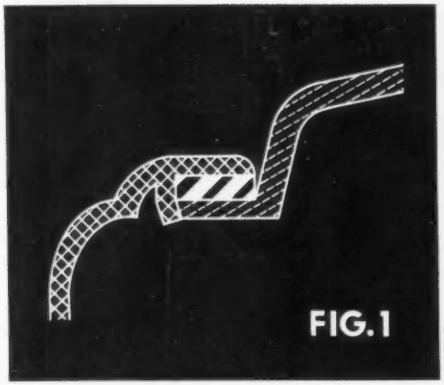
A new series rotary-gear hydraulic pumps offered by Lear, Inc., Romec Division, Elyria, Ohio, is designed to meet specific flow and pressure requirements of tractors, trucks and construction tools, and is applicable to other heavy-duty hydraulic applications.

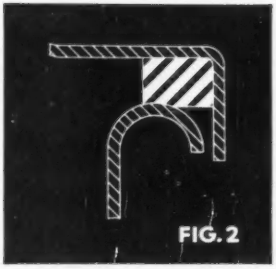
(*Turn to page 82, please*)

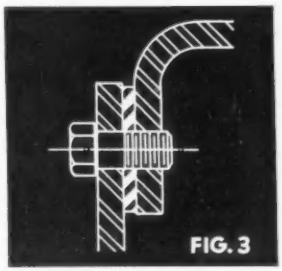


Lear-Romec rotary-gear hydraulic pump, Model RG-7380

Designing joints for low-cost sealing







An effective seal at least cost is usually the result of designing the joint and its gasket as a unit. In this way, alternate types of flange construction with their appropriate gaskets can be judged against specific application requirements to determine the most economical method for sealing a given joint.

For many applications, stamped or spun metal flanges may offer attractive cost advantages. Such flanges, however, often impose severe demands on ordinary gasket materials because of their irregular surfaces, lack of rigidity, and smaller areas of contact.

In such cases, an Armstrong's Cork-and-Rubber Composition usually will provide an effective, low-cost seal. In these materials, compressible cork particles are combined with synthetic rubber to provide soft, impervious compositions that will seal irregular surfaces with relatively low bolt pressures.

In figure 1, for example, a molded plastic lens and crimped die-cast flange are sealed against weather. The soft cork-and-rubber composition seals tightly by conforming to surface irregularities in both the flange and the lens.

To seal the rolled edge tank and pressed steel cover shown in figure 2, a somewhat firmer cork-and-rubber composition was chosen. Truly compressible cork-and-rubber seats firmly on the rolled edge to provide a tight seal. The exposed cork particles provide added friction, so the gasket won't tend to slip out of place.

Cork-and-rubber, likewise, provides an effective low-cost seal in the assembly shown in figure 3. The gasket not only seals tightly between the flanges, but it also fits snugly around the bolts to prevent seepage.

Gaskets made from an Armstrong's Cork-and-Rubber Composition may provide similar savings for you. Your Armstrong representative will be glad to give you details.

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You'll find useful application and specification data in the new, enlarged 24-page booklet, "Armstrong's Gasket and Sealing Materials." It contains up-to-date data on synthetic rubber, cork-and-synthetic-rubber, cork composition, and fiber sheet sealing materials.

This booklet includes ten technical discussions of the factors influencing modern gasket and joint design. It also suggests methods of putting Armstrong's stock materials to specialized uses in such fields as radio, electrical, automotive, petroleum, and transportation industries. Also included are typical applications and current government specifications.

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Automatic Transmissions

(*Continued from page 67*)

throttle valve, which connects by a link to the accelerator pedal, and after its pressure has been reduced more or less, according to the position of the pedal, it passes on to the control valve. In the latter the hydraulic pressure controlled by the throttle valve acts together with a coil spring against one end of the valve, while the hydraulic pressure controlled by the centrifugal valve acts against the other end. The pressure from the centrifugal valve increases with the car speed, and when it becomes sufficiently large to overcome the combined forces of the spring and the oil pressure from the throttle valve against the other end, the control valve opens and admits hydraulic pressure to the servo and the clutch cylinder. The shift from first to second occurs at speeds between 5 and 15, from second to third at speeds between 10 and 30, and from third to high at speeds from 20 to 70 mph. The shift occurs at the higher speed of the range when the accelerator is nearly or all the way down; at the lower speed of the range when the pedal is only slightly depressed. By pushing the accelerator pedal beyond the point of full throttle opening the driver can make a downshift from fourth to third speed at any time, provided the car speed is less than 65 mph.

The arrangement of the control lever on 1949 Oldsmobiles equipped with Hydra-Matic drive is illustrated in Fig. 5. It conforms in a general way to the arrangement of the controls on conventional cars, except that there is no clutch pedal. The brake pedal is in the usual position, to the right of the steering post, and the accelerator pedal is adjacent to it. Both of these pedals therefore are operated by the right foot, as usual. From one point of view it would be advantageous to have the brake pedal to the left of the steering post, so it would not be necessary to shift the foot from one pedal to another. But this would call for a departure from normal driving practice, and evidently would involve some hazards. The brake pedal is slightly farther to the left than on the conventional car, so that the driver can operate it with his left foot if he so desires, and it is not impossible that as the years roll by it will be moved still farther to the left for more convenient operation with the left foot. As it is, the absence of the clutch pedal certainly facilitates operation of the headlight control.

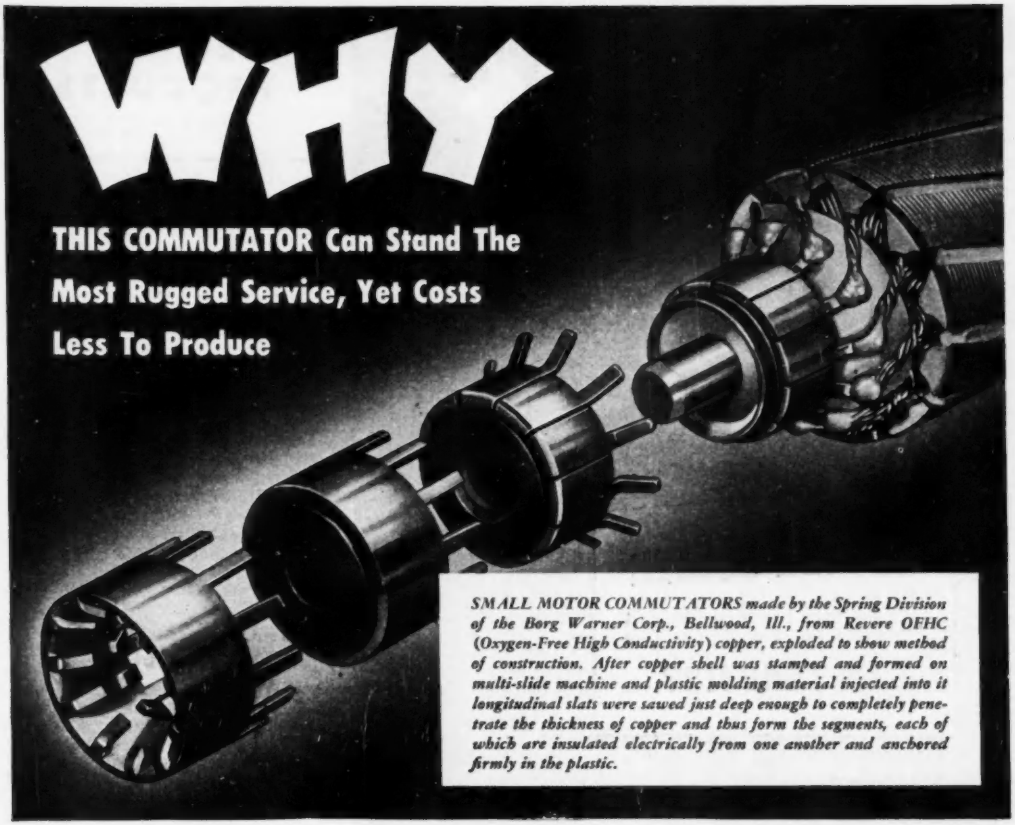
At the top of the steering post there is a shift lever or selector lever which has four different positions: N for neutral, Dr for driving, Lo for low, and R for reverse. There is an indicator on the forward side of the steering post which clearly shows the position the lever is in. When making an ordinary start the driver shifts the lever from the N to the Dr position and then controls the speed of the car entirely by means of the accelerator. For short stops the lever remains in the Dr position. With the selector lever in the Lo position the car can be driven only in first and second speeds.

Because the Hydra-Matic provides four forward speeds and the hydraulic coupling protects the engine against overloads, cars equipped with this transmission can be built with a smaller rear-axle-reduction ratio than those with the standard transmission. This results in fewer engine revolutions per mile traveled, and in consequence reductions in the fuel consumption and in engine wear. With the Hydra-Matic the engine can be used as a brake to hold the car in check on long down grades by placing the selector lever in Lo. If the battery should become exhausted and the engine fail to start in the regular way, it can be started by pushing the car at 20 or more mph and then moving the selector lever to "Dr" position.

Part V of this series on Modern Automatic Transmissions will appear in an early issue of AUTOMOTIVE INDUSTRIES.

WHY

THIS COMMUTATOR Can Stand The Most Rugged Service, Yet Costs Less To Produce



SMALL MOTOR COMMUTATORS made by the Spring Division of the Borg Warner Corp., Bellwood, Ill., from Revere OFHC (Oxygen-Free High Conductivity) copper, exploded to show method of construction. After copper shell was stamped and formed on multi-slide machine and plastic molding material injected into it longitudinal slats were sawed just deep enough to completely penetrate the thickness of copper and thus form the segments, each of which are insulated electrically from one another and anchored firmly in the plastic.

IT was quite a complex problem the Spring Division of Borg Warner Corp. dropped into the lap of Revere's Technical Advisory Service. They were getting set to manufacture commutators for small motors and they wanted to select the best material for the job.

Here were the specifications: The material had to be the hardest possible yet still able to take the extremely severe forming operation which was to be done in a multi-slide machine. High hardness was necessary in order to combine maximum wear resistance with the ability to withstand the extreme centrifugal force developed in small motors operating at high speeds. In addition, in the molding operation, which is done after the copper shells have been formed, it was necessary to hold the diameter of the shell to within .001" in order to prevent the plastic from flowing between the mold and the outer surfaces of the commutator. An equal tolerance was also imposed upon the height of the solid cylindrical portion for the same reason. Also of great importance was the need for the cylinder wall being almost absolutely flat.

Because of long experience with somewhat similar problems Revere recommended trial of OFHC (Oxygen-Free High Conductivity) copper, four numbers hard. This was tested along with several other metals. The OFHC alone was found to produce excellent parts, and with tolerances so close as to be almost unbelievable in this type of operation. All other types of copper failed at the very sharp bend where the anchoring lugs join the side of the shell.

An unusual feature of these commutators is the plastic material used in the core. Tough, and unusual in composition, it serves both as insulation and as a mechanical connection between commutator and shaft without use of a bushing and key.

To determine if these commutators could *really* take it, test motors in which they were used were speeded up to 35,000 rpm. Although the wiring in the rotors practically exploded at that speed, there were no failures in the commutators, Temperature tests up to 400° F. were also made. Here again there was no damage to the commutator, though the rotor wiring was badly damaged due to the combination of centrifugal force and decrease in wire strength. Once again the unusual combination of properties of Revere OFHC copper had played a part in helping another one of the country's leading manufacturers produce an outstanding product at less cost.

Perhaps this or some other Revere Metal can be of help in improving your product—cutting your production costs. Toward that end we suggest that you get in touch with your nearest Revere Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.
Sales Offices in Principal Cities, Distributors Everywhere.

NEW PRODUCTS

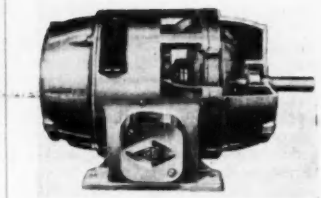
For additional information please use coupon on page 52

(*Continued from page 78*)

Model RG-7380 is intended for direct drive from an S.A.E. flange-type magneto mounting pad. Delivery is 5 gpm at 1000 psi and 1800 rpm, and permits intermittent pressure of 1500 psi. It uses any light, petroleum base oil. Case is aluminum alloy with closely fitted hardened steel impeller gears and lead-bronze bearings. A trouble-free mechanical shaft seal incorporates an air-check device that prevents entrance of air during self-priming starts, eliminating hazard of entrained air in the oil system. Ports are tapped for standard pipe thread, ½-in. NPT inlet and ⅜-in. NPT outlet. Direcion of rotation for described pump is clockwise viewing drive end. CCW rotation is optional.

F-71—Fluid-Shaft Electric Motors

New development in electric motors announced by the Reuland Electric Co., Alhambra, Calif., consists of fluid-shaft motors featuring a single frame, integral design motor and fluid-drive coupling. This integrally designed electric fluid-drive motor is said to effect



Reuland fluid-shaft electric motors

savings in both original cost and mounting area. Additionally the new fluid-shaft units utilize regular Reuland electric motor frames and end bells, to eliminate still further the need for special expensive parts.

Fluid-shaft motors are said to offer smooth acceleration, protection from "jamming" and shocks, and ease of starting in such typical installations as conveyors, extractors, bridge and trolley drives on cranes, winders and mixers.

There is no need to "overmotor" on loads that are tough to bring up to speed when using fluid-shafts, the company explains, because the motor is practically up to speed before any load

(*Turn to page 85, please*)

You can increase production capacity and...

REDUCE the COST of

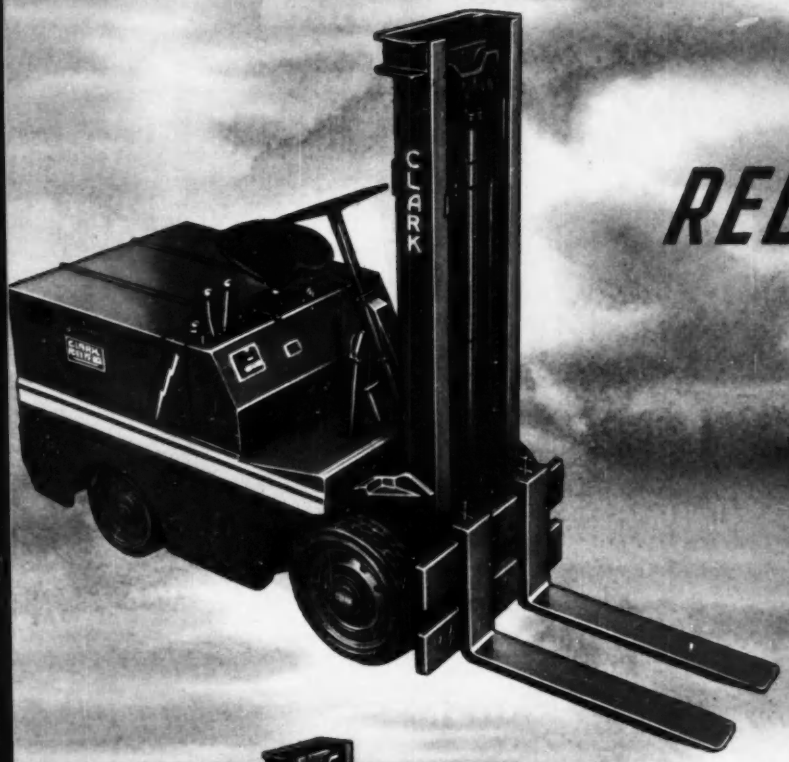
Unloading...

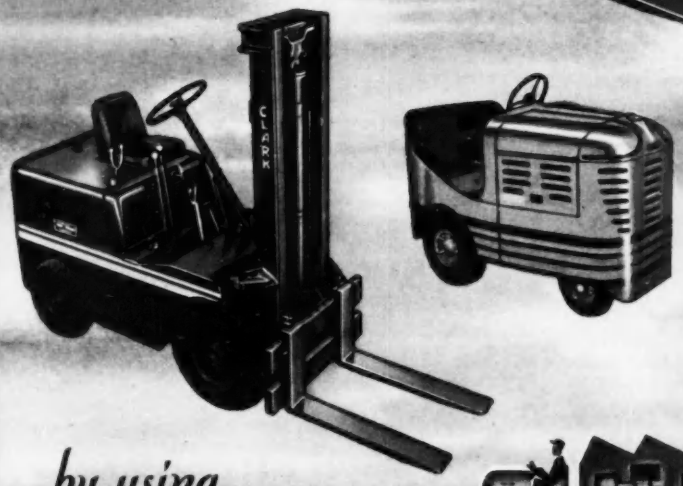
Storing...

Moving...

Shipping

MATERIALS





by using

CLARK fork-lift trucks
AND TOWING TRACTORS

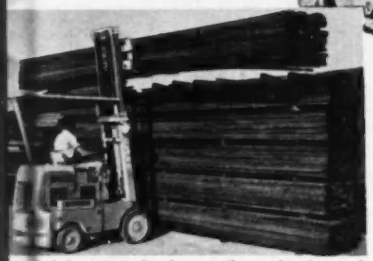
CLARK EQUIPMENT COMPANY, Buchanan, Michigan

Other Plants: BATTLE CREEK, JACKSON, BENTON HARBOR, MICHIGAN

SEE HOW→

MATERIAL HANDLING *News*

Handling this 1000-lb. fan sheet for a cooling tower—formerly a slow, risky operation—now is accomplished with ease and safety.



Orderly storage plus the versatile speed and strength of Clark fork-lift trucks has solved the basic problem of handling 5000 items.

By the old method, handling heavy units like this gear-reduction unit was slow, difficult and often dangerous. It's simple enough now.

There's a place for every item—and every item in its place—weather-proof materials stored in the yard; others in the warehouse.

FOUND: the Number 1 Solution to Marley's Number 1 Problem

How to store and handle 5000 items most efficiently and economically was a vexing problem for The Marley Company, Inc. Those items are the parts and fabricated units for assembling Marley Cooling Towers used in industrial cooling, refrigerating and air-conditioning installations—parts ranging from small bolts and brackets, plates and pipe lengths, to huge cooling-tower units. Fabricating is done at the Company's main plant in Fairfax, at Stockton, California, and at Louisville, Kentucky; the Fairfax plant houses the general offices as well as a machine shop and a distribution warehouse.

A carefully-conceived storage plan implemented by fork-lift trucks proved to be a highly effective answer to that Number 1 problem. Adequate storage space is allotted to each item—indoors or in the yard, depending on its character; and each item is *kept in its place*, readily accessible for speedy withdrawal.

Today, as a result of intelligent planning and systematized use of the fork-lift trucks, even the bulkiest, most unwieldly items are unloaded quickly, stored immediately and later reloaded in a jiffy. There is no confusion, no appearance of haste—yet, say Marley officials, handling time has been reduced by at least 90 per cent. Furthermore, the handling of many units which, by manual methods, was extremely slow, back-breaking and hazardous work, is now done easily and safely—serious accidents have been almost entirely eliminated.

Write for Material Handling News

The Material Handling News, with profusely-illustrated reports of increased production at decreased cost, should be MUST reading for every alert businessman. A request on your business letterhead will bring you the current issue.

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS** AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., **CLARK EQUIPMENT COMPANY** BATTLE CREEK 60, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

PRODUCTS OF CLARK—TRANSMISSIONS · FORK TRUCKS & TRACTORS · AXLE HOUSINGS
GEARS AND FORGINGS · RAILWAY CAR TRUCKS · ELECTRIC STEEL CASTINGS
FRONT AND REAR AXLES FOR TRUCKS AND BUSSES · METAL SPOKE WHEELS · TRACTOR UNITS

NEW PRODUCTS

For additional information please use coupon on page 52

(*Continued from page 82*)

is applied. Therefore when purchasing, motors can be selected closer to actual horsepower requirements. A saving in power is likewise accomplished because of considerable reduction in starting current required. Protection against "jamming" of equipment is assured because all starting and operating shocks are absorbed in a cushion of oil.

Available in standard foot mounted, or round body frames, all units can be mounted horizontally or vertically, or with NEMA flange and face type end bells. Installation requires no special engineering.

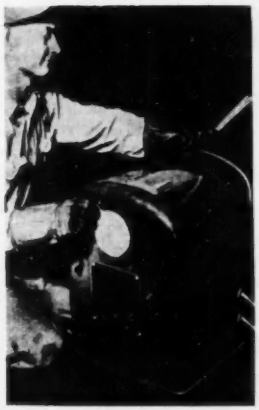
Units are available in ½, ¾, 1, 1½, 2, 3, 5, 7½, and 10 hp.

Units in combination with motor-reducers are also available in either single or double reduction types. They provide in one compact power package, fluid-drive, electric motor, and gears for slow output speeds.

F-72—Industrial Welder

The "Fleetwelder" 200 amp AC industrial type welder announced by the Lincoln Electric Co., Cleveland, Ohio, is a NEMA rated unit with adequate reserve capacity over its rated maximum load of 250 amps. Suited for both job shop welding and industrial welding, electrodes ranging in dia from 5/64-in. to ¼-in. may be used with it. Low-current welding of thin sheets is

(*Turn to page 90, please*)



Lincoln Electric's NEMA rated 200 amp AC "Fleetwelder"

Gold Comet Engine

(*Continued from page* 58)

second takes the No. 3-4-9-10 cheeks. Two No. 7-ACL LeBlond crankshaft lathes, with double center drive, rough turn all main bearing journals, gear fit and pulley diameters, and the OD and face flange and hub. This machine, as well as the other lathes, is fitted with the LeBlond mechanical loading and unloading mechanism to facilitate handling.

Turning and cheeking of all crankpins is done in a No. 6-AC LeBlond double-spindle lathe. Turning and chamfering of OD of counterweights is handled in a 12 by 45 Fay automatic lathe.

Following a series of detail operations, the shaft is Tocco-hardened, stress relieved and straightened. Then follows a series of grinding operations:

Rough grind No. 1 main bearing journal in a 10 by 48 Norton grinder.

Rough grind No. 2, 3, 4, 5, 6, and 7 main bearing journals in a 10 by 48 Norton grinder.

Rough grind crankpins in a 16 by 42 Landis hydraulic grinder.

Finish grind No. 1 main bearing journal in a 10 by 48 Norton.

Finish grind No. 2, 3, 4, 5, 6, and 7 main bearing journals in a 10 by 48 Norton.

Finish grind crankpins in a 6 by 42 Landis hydraulic grinder.

Finish grind gear fit and pulley diameter in a 10 by 48 Norton CTU grinder.

Finish grind OD and face of flange in a 10 by 48 Norton CTU semi-automatic.

One of the largest pieces of equipment in the department is the special W. F. & John Barnes horizontal duplex drilling machine for drilling the ends of the crankshaft. The machine has four stations, each one having two sets of drill heads so as to accommodate two different types of shafts without changing tooling. In addition, each of the drill clusters is of easily detachable type to facilitate a complete retooling of the machine in the event of a major change in product design. For the OA shaft, the machine is tooled at the flange end for drilling, countersinking and tapping six holes, reaming two holes and drilling the pilot bushing hole; and drilling, recentering and tapping the hole in the front end.

Crankshafts are balanced in a Gisholt Dynetric balancer fitted with two Leland-Gifford drills. Final operation is Magnaflux inspection.

Quality Control

(*Continued from page* 34)

lost in the anonymity of a mass organization. The charts offer visual cognizance of his individual performance. As a consequence, a good chart has become cause for justifiable self-pride. It follows therefore, that some of the responsibility for the maintenance of quality has been assumed by the worker who, in the last analysis, is the most directly responsible for it. The idea inherent in quality control is not meant for use as a "watch-dog" or silent "eye" —nor is it intended as a production "whip." The sole purpose of the chart is to see that the maximal number of the finest quality products are made through the optional use of its materials and labor.

Transmission

(*Continued from page* 44)

bearings on the central mainshaft.

While the first gearboxes have been produced with an electro-magnetically engaged friction type clutch, a centrifugal clutch also is being designed. The design lends itself to semi-automatic control with a governor sensitive to car speeds and throttle opening. By having all pinion bearings interchangeable, main magnets identical and synchronizers interchangeable, the manufacturer has reduced production costs.

broaching will really save you money on those close tolerance high speed internal gears

HERE'S AN ACTUAL CASE:

The Old Production Line-Up	The Way It's Handled Now
1. Rough Broach	1. Rough Broach
2. Shape	2. Finish Broach
3. Shave	
Required Tolerance .0002"	Required Tolerance .0002"

EQUIPMENT USED:

1 Broaching Machine	4 Broaching Machines
18 Gear Shapers	
2 Gear Shaving Machines	

These are actual figures from a well known automotive gear plant which adopted the all-broaching procedure about 2 years ago. Since then savings have been spectacular.

Of course they don't use the garden variety of broaches. The savings and precision achieved would not be possible with ordinary tools.

This plant uses NALOY BROACHES each of which is good for 38,000 gears before it is retired. Naloy broaches have characteristics (and we can prove this) that the average broach shop just doesn't have the facilities to duplicate.

If you want Precision with maximum economy, send for a Red Ring Broach Engineer.

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN • • • • • • • • • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Materials Handling

(*Continued from page 27*)

or unit packaging if same is not provided by vendor. He checks quantities received against packing slip in order of arrival and writes receiving report promptly. He also writes material transfer showing clearly bay and area to which material is to be transported and pressures transportation to keep materials flowing out of the receiving room or from unloading area.

A truck arrival recording chart, showing time of arrival and unloading time for the traffic department is arranged for by the materials handling engineer. He also arranges for packaging, transportation and records, as with rail shipments.

A competent dispatcher keeps a record of where trucks are operating by departments and provides plant-wide service wherever needed. Flow charts are prepared to show possible back tracking and unnecesary trips. Charts also show plant or material layout changes and are kept current. Trucking equipment is allocated for most efficient usage. A supervisor travels throughout the shop continuously. Time recorders on trucks to show period of day when trucks are operating, and readings are tabulated daily. Preventive maintenance periodic service checkups are scheduled, including painting and cleaning when needed. Appropriations are obtained for replacement of worn-out units with most modern available.

The foregoing seems to add up to this: That the materials handling engineer has one of the most important jobs in modern industry, with full responsibility for all productive materials and inventory within the plant. To meet this great responsibility, he should have complete authority to receive, transport, store, package or ship, using the most modern equipment and methods. It is up to him to maintain an ever constant, uninterrupted flow of material from the time it enters the plant until it leaves as a finished product.

Under such circumstances, the materials handling engineer brings in dollars and saves dollars for the corporation. He may be the difference between profit and loss.

CALENDAR

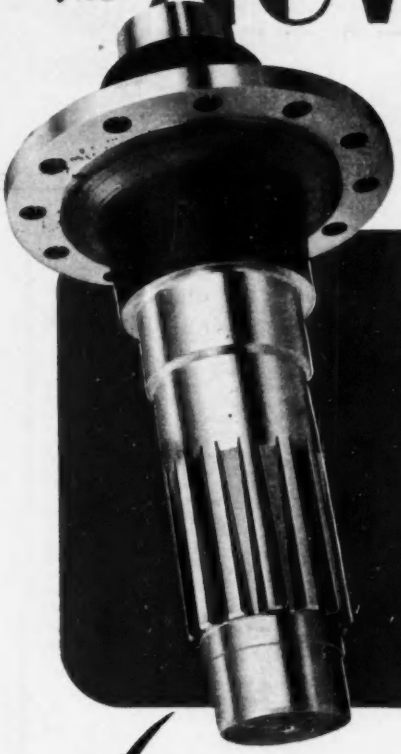
Conventions and Meetings

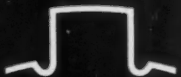
Instrument Soc. of America Convention, St. Louis .....Sept. 12-16
Amer. Chemical Soc. Atlantic City, N. J. .....Sept. 18 to 23
Inst. of Traffic Engineers, Washington, D. C. .....Sept. 25-28
British Passenger Car Show, London, Sept. 28-Oct. 8
Nat'l. Defense Transportation Assoc., Atlanta .....Oct. 3-5
Nat'l. Lubricating Grease Inst., New Orleans .....Oct. 3-5
Society of Industrial Packaging and Materials Handling Engineers Annual Exposition, Detroit ....Oct. 4-7
Paris Auto Show, Paris .....Oct. 6-16
Amer. Soc. for Testing Materials. Pacific Nat'l Mfg., San Francisco Oct. 10-14
Amer. Society for Metals Nat'l Metal Congress & Exhibition, Cleveland, Ohio .....Oct. 17-21
Amer. Welding Soc. Annual Mtg., Cleveland .....Oct. 17-21
Amer. Inst. of Mining & Metallurgical Engineers Metals Br., Cleveland Oct. 17-21
10th Annual Mtg. & Dinner Automobile Old Timers, New York City Oct. 18
Nat'l. Safety Council Safety Congress & Exhibit, Chicago .....Oct. 24-28
Nat'l. Metal Trades Assoc., Annual Convention, Chicago .....Oct. 26-28
Amer. Society Body Engineers Annual Tech. Convention, Detroit Nov. 2-4
Chicago Auto Show, Chicago .....Nov. 4-12
Society for Experimental Stress Analysis Annual Mtg., New York Nov. 30-Dec. 2
Plant Maintenance Show, Cleveland Jan. 16-19
Pacific Automotive Show, San Francisco .....Feb. 16-19
Amer. Road Builders' Assoc., Cincinnati .....March 6-9
3rd Highway Transportation Congress, Washington .....Apr. 26-27
International Motor Show, Turin, Italy May 4-14

The Newest DEVELOPMENT

IN POWER TRANSMISSION -

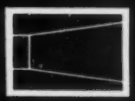
TAPER ROOT INVOLUTE SPLINES



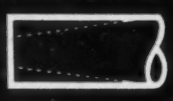


TAPER ROOT PARALLEL KEY HOBS REQUIRE SUBSTANTIAL GENERATING LUGS TO INSURE STRAIGHT AND PARALLEL KEYS TO THE ROOT DIAMETER. TO ELIMINATE ASSEMBLY INTERFERENCE THESE LUGS ARE SUBJECT TO QUICK WEAR AND REDUCE HOB LIFE.

TAPER ROOT INVOLUTE HOBS REQUIRE GENERATING LUGS APPROXIMATELY ⅓ THE HEIGHT AND WIDTH OF THOSE USED FOR PARALLEL KEY DESIGN. IN SOME CASES THESE MAY BE ELIMINATED ENTIRELY ADDING ADDITIONAL ROOT CONTACT AREA.



MATING HUB LOCATES ON THE TAPER. INVOLUTE FORM IS SELF-CENTERING. ALL LOAD STRESSES AND BEARING ARE EQUALIZED. STANDARD BROACHES ARE USED AFTER FINISHING THE TAPER HOLE TO SIZE.



SINGLE INVOLUTE HOB CUTS ANY STANDARD P.D. OF THE SAME PITCH AND ANY CONVENTIONAL INCLUDED ANGLE. LESS STOCK REMOVAL PER TOOTH SPACE PERMITS LARGER SHAFT CAPACITY IN THE MACHINE.

PROVIDES

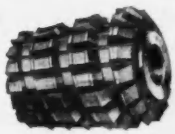
- APPROXIMATELY 50% GREATER CONTACT AREA

GIVES

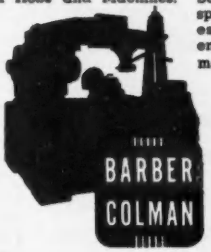
- STRONGER MOUNTINGS WITH SIMPLIFIED TOOLING

PERMITS

- EASIER MACHINING WITH PREDICTABLE ACCURACY, AT LOWER TOOL COSTS



Write One of the outstanding advantages of Taper Involute Splines, recognized by design engineers, is that *standard* gear methods are used to produce them. You are invited to send for full information on the methods used to hob these splines easily, rapidly and economically, using Barber-Colman Hobs and Machines. Send prints and specifications for estimates to our engineers, Department 3638.



Barber-Colman Company

GENERAL OFFICES AND PLANT 3638 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.

NEW PRODUCTS

For additional information please use coupon on page 52

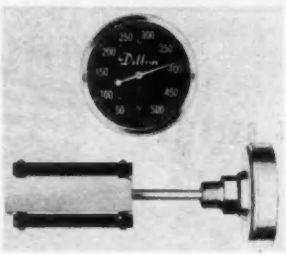
(*Continued from page* 85)

simplified and high-current welding of heavy plate is hastened through a Lincoln arc booster. The arc booster adjusts the welder to start the arc automatically the instant the electrode touches the work on either thin or heavy material. The arc is given an extra burst of current which starts the arc and secures penetration at the start of the weld. The current automatically returns after a few seconds to the correct amount set for the job. Unit can be equipped with wheels for portability. Total weight, 319 lb.

F-73—Magnetic Thermometer

A flat stem magnetic thermometer, manufactured by W. C. Dillon & Co., Inc., Chicago, Ill., fits the need in dozens of applications where heat must be indicated, but where conventional round stem instruments cannot do the job because of their shape. Transformers, engine blocks, air ducts, exhaust ports, etc., can be checked with the device.

The large flat area quickly gathers and retains heat from the surface under



Dillon flat stem magnetic thermometer

test, actually covering the heat area like a blanket. The magnets enable the operator to place the thermometer on a flat surface and "peel" it off in an instant, saving time usually required, with more complicated fittings.

Stem lengths range from as short as 3 in. up to and including 42 in. long, available in either F or C calibrations. The thermometer is pressure proof, withstanding better than 3476 lbs psi. Accuracy is claimed to within 1 per cent of the full scale reading. The magnetic flat stem model can also be screwed into tanks, kettles, steam lines, etc., by removing the magnetic portion of the stem.

4,200 HOURS' OPERATION—STILL SLUDGE-FREE

Sun Diesel Lubricating Oil Almost Good As New After Outlasting a Competitive Product 5 to 1

A prominent manufacturer uses 6-cylinder, 4-cycle diesels to generate power. Recently, at the suggestion of one of our engineers, a Sun diesel lubricating oil was tried in one of the units.

Results were impressive. Inspected after three months, the engine was found to be in the cleanest condition since installed. In tests run against competitive oils, one manufacturer's product sludged up in 600 hours. Yet the Sun oil was practically as good as new after 3,000 hours, showing but a slight increase in neutralization number. In further tests, the Sun oil ran 4,200 hours in six months' operation without a change; the engine remained clean and sludge-free, and showed no signs of wear.

On the basis of this performance, the plant has extended the use of Sun oil to other diesel units.

Here is just one example of the records being set by Sun "Job Proved" lubricants in all their wide applications. You can rely on Sun products to keep diesels, turbines, steam engines and other power equipment operating smoothly and with minimum maintenance. To get complete information call the nearest Sun Office. For Technical Bulletin "Lubrication of Diesel Engines," write Department AA-9.

SUN OIL COMPANY • *Philadelphia 3, Pa.*
In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

HOUGHTON ANNOUNCES

A new All-Star Line-up of

RUST PREVENTIVES

"RUST VETO" IS THE NAME

To distinguish between industrial and government specification types of corrosion preventives, Houghton has applied the brand "RUST VETO" for industrial applications, and the other well known "COSMOLINE" brand (Reg. 1881) to those compounds conforming to government specifications. Many Cosmoline brands now meet such "specs."

11 proven safeguards for industry's never-ending fight against

RUST

After painstaking evaluation of its long line of rust preventives, Houghton now announces a revised line-up of eleven products which will meet practically all your needs for prevention of rust either indoors or out.

These eleven are not all new. They need not be, for we've been helping industry fight rust for some eighty years, and have developed a wide variety of compounds that have served metal men long and well.

Note the line-up at the right: five solvent types, four removable and one non-removable . . . five oil and grease types, ranging from an SAE 10 fluidity to a heavy grease. Also a concentrated base for dilution with oil or solvent in the user's plant, for economical indoor protection.

For detailed description and recommendations for your corrosion problem we invite you to use the handy coupon below.

Product	Type of film
Rust Veto 344	Solvent type, dry film, removable
Rust Veto 110-D	Solvent type, dry film, unremovable
Rust Veto A-2	Solvent type, dry film, waxy type
Rust Veto 366	Solvent type, light oil
Rust Veto 255	Fingerprint controlling
Rust Veto Light	Light oil type (SAE 10)
Rust Veto Medium	Medium oil type
Rust Veto Medium Heavy	Heavy oil type
Rust Veto Heavy	Soft grease type
Rust Veto Extra Heavy	Solid grease type
Rust Veto Concentrate	Light oily film (when diluted)

Fill out and mail this coupon to receive new illustrated booklet on Houghton's All-Star Line-up of RUST VETO compounds that prevent rust.

E. F. HOUGHTON & CO.
303 W. Lehigh Ave., Phila. 33, Pa.

Send me the new Rust Preventive booklet.

NAME_____

COMPANY_____

CITY_____ STATE_____

Huge Dynamometer

(*Continued from page 43*)

automotive brake is as follows:

The flywheel is rotated by the motor and acts as a reservoir to store up energy. The flywheel energy is transferred to the brake drum through the flywheel shaft. When the brake is applied (either with or without the motor energized, depending on the type of test being made) the brake shoes move out into the drum; and, since the drum is rotating and the brake is stationary, a force is developed between the shoes and the brake drum which tends to rotate the brake. By virtue of the brake mounting, the tendency to rotate the brake is transferred through the torque shaft to the torque arm and eventually to the scale, which measures the torque or brake output. This is essentially the conventional brake testing method.

It is also possible to test an entire axle assembly with the new equipment, if this method of testing becomes desirable. A mounting is provided at the side of the flywheel so that an arm can be bolted directly to the base of the dynamometer, in line with the centerline of the flywheel. An axle assembly can then be mounted on the arm so that the tire of the wheel presses onto the periphery of the flywheel. An air cylinder presses the wheel onto the flywheel with the required force to simulate the portion of the vehicle weight supported by one wheel. The flywheel energy is transferred to the brake through the tire and wheel assembly and is absorbed as the brake brings the flywheel to a stop.

With the new Bendix dynamometer brake testing equipment, it is possible to test brakes up to 300,000 in. lb torque and the maximum capacity is 38,800,000 ft lb kinetic energy. New designs may be charted as to kinetic energy, torque capacities and performance characteristics and made available in graphs and charts.

It is said that with the new equipment, Bendix is in a position to pioneer more diversified adaptions and uses for new and the now existing types of brakes.

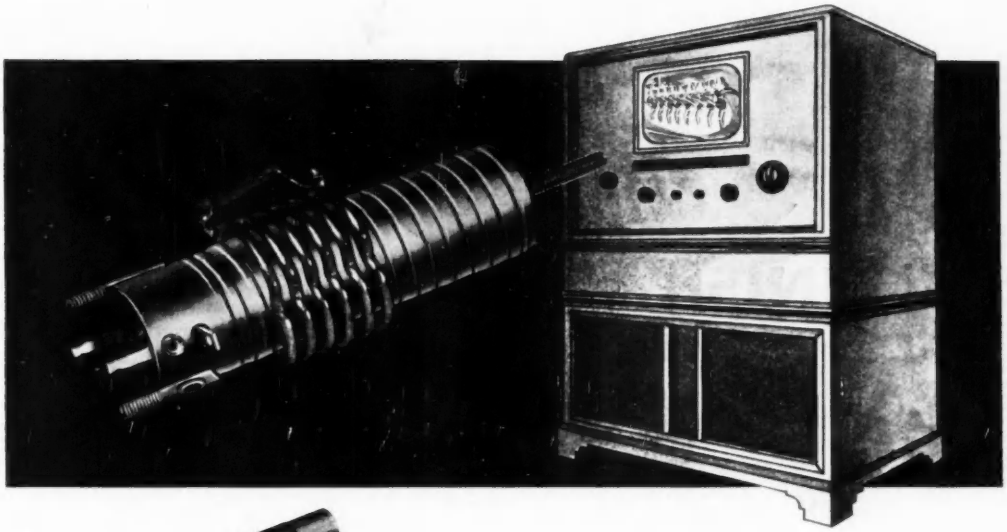
AIRBRIEFS

(*Continued from page 36*)

decimal places using material accurate to only three decimal places. Gusts and turbulence in the air prevent any airplane from flying steady and level in the absolute sense. In the case of a Cub this is not objectionable but, in the case of a 600 mph bomber, weaving and bobbing about in the air is not conducive to either high speed or accurate bombing. The swept wing has introduced certain directional stability problems all its own. Boeing engineers found that, whereas the XB-47 Stratojet bomber was—of course—stable, according to the definition that requires the generation of restoring moments, it didn't cut fine enough the requirements. The airplane proved subject to "Dutch roll" in which a slight yaw produced a slight roll, which produced a slight yaw in the opposite direction, etc., so that the plane wallowed through the air like a Dutchman ice skating on a Holland canal. The solution to the problem was found in the rate gyro, which is sensitive only to the rate of displacement and not to the amount of displacement, as is the conventional automatic pilot. This rate gyro is connected to an amplifier and thence to a small motor, which drives the rudder. This device cut the yaw and roll of the airplane to less than one-tenth of one degree but further refinements are now under way. Air Force and Naval Aviation are studying the possibilities of this device for application to other unstable aircraft but one consideration worries both services: what happens when this equipment malfunctions or is damaged by enemy gunfire?

another C-D development . . .

a strong, lightweight, LOW-COST tubing for your electrical applications



Spiral Tubing—one of the many developments that have helped bring television into the mass market. Recently introduced by Continental-Diamond laboratories, it is ideal for electrical, radio, and television applications where a good dielectric tubing with high strength and lightweight is needed. It is available in a variety of sizes and grades to meet requirements for low moisture absorption, forming, riveting, drilling, tapping, etc.

It is another example of why it pays to see C-D first in your search for the right plastic. C-D Plastics provide *practical* combinations of mechanical, electrical, and chemical properties—structural strength, lightweight, moisture, heat and corrosion resistance. For fast delivery, or help with material selection problems, call your nearest C-D office, any time.

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Discussion of Pension Problem

(*Continued from page* 25)

thrift, for their own or each other's non-productive periods.

The question is solely to what degree individuals and family groups are to retain their individual responsibility for and jurisdiction over their own savings, or to what extent, acknowledging incurable spendthriftness, they are to forfeit those savings and the responsibility of their management to employers, union, or government while submitting to the mass disciplines and standardized compensations that result.

Cost of Pensions

The union wants a pension of $125 a month upon retirement at or after age 65 for all of its members, regardless of the respective ages of those employes at the time the pension plan is made effective, and regardless of length of service before retirement.

Let me cite some examples of what pensions cost.

Take John Smith. He is forty years old the day the plan becomes effective on which day he also starts to work for U. S. Steel. If he goes to an insurance company as an individual, he will be told that in order to get the $125 pension at age 65 he must pay an annual premium of $597.25 in each of the following 25 years. These amounts, with interest, would build up to $19,870 by the time John Smith is 65 years old. This sum would provide for and be drawn upon to pay his pension.

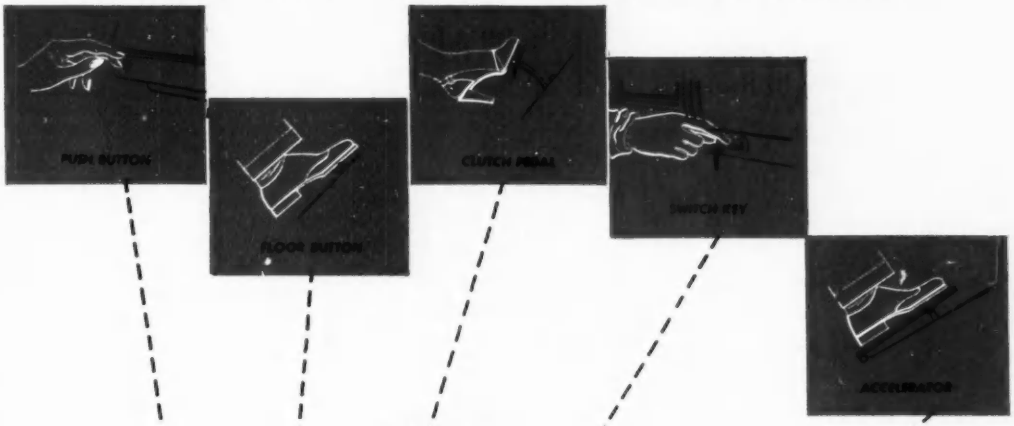
Take Bill Jones. He is 65 and retires from U. S. Steel the day after the plan becomes effective. The insurance company would tell him that in order for him to have the $125 pension he would have to put up the whole $19,870.

The point is that to have money to spend in a non-productive period someone must first have accumulated the money. This makes the starting of a pension system a quite different financial matter from that of keeping it going after it has been operating on a sound basis for a long time. If a pension plan had been in effect a long time, amounts for all the employes, like the $597 for John Smith, would have been paid annually into a fund beginning on the day each employe first entered the service. Such annual amounts, continued into the future, constitute what is customarily called *future service cost*. This cost is recognized by the union; and for all our employes as a group it amounts to $42.5 million per year, according to a skilled public actuary who does work for unions, industry and government.

But when a plan like that proposed by the union is first started there has been no accumulation for those who

(*Turn to page* 98, *please*)

SPECIALISTS IN ALL TYPES OF STARTING



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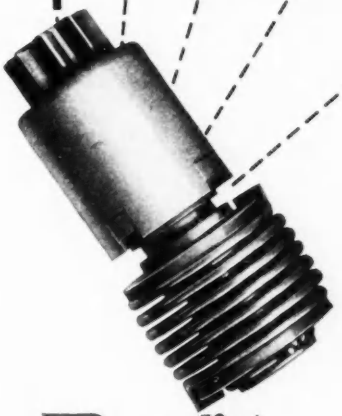

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STARTER DRIVE

When Industry endorses a product to the extent of 80 *million* installations, little need be added—that product is proved beyond question. This record has been achieved by the Bendix® Starter Drive. Its versatility, reliability and economy have made it the overwhelming choice for push button, floor button, clutch pedal, accelerator and automatic starting applications. No matter which kind of starting you employ, insist on *known* quality, specify Bendix Starter Drives—the best proved in the industry. ®REG. U. S. PAT. OFF.

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Discussion of the Pension Problem

(*Continued from page* 96)

immediately or soon will become entitled to pensions, or for others who have been in the service for varying periods of years but have not reached retirement age. The money isn't there. The aggregate amount, with interest, that would have been paid in, if the plan had been operating, but which hasn't been paid in at the time it is started, is customarily called *past service cost.*

The past service cost for U. S. Steel, according to the actuary, amounts to one billion dollars. This large amount is approximately equal to the present market value of all the outstanding stock of the U. S. Steel, both preferred and common.

The union recognizes the past service cost but holds there is no need to put up the one billion dollars. Instead it would have the sums collected in behalf of employes in service used directly to pay pensions for those retiring, rather than accumulated to protect the pensions of those currently employed when they retire. But the future service amounts currently collected would be inadequate because those amounts are calculated on the assumption of actuarial soundness, which, in turn, relies partly on the interest earned on accumulated funds to defray the payment of pensions. To meet the current deficiency the union would increase the $42.5 million annual payment for future service cost by a $25 million amount equal to the interest which the one billion dollars would have earned had it been accumulated. This additional annual payment would merely serve to keep the one billion dollar past service cost from growing; it would not pay off or even reduce the liability.

To put it bluntly, that which the union leaders propose is that this year's crop of pensioners gets theirs in cash, while yesterday's gets nothing and tomorrow's receives an unsecured promise.

Should a past service liability amounting to one billion dollars be imposed, sound financial policy would demand, as would security of the pensions themselves, that the liability be met by creating an equivalent fund. The best any company could do would be to set aside an amount annually

(*Turn to page* 104, *please*)

General News

(*Continued from page 23*)

erable return to private enterprise and, so far as engines are concerned, construction under foreign license.

USAF Awards $1 Million Contract to Ryan

The Ryan Aeronautical Co. has been awarded a new million dollar U. S. Air Force contract to continue the development and fabrication of an additional quantity of Ryan XQ-2 remotely-controlled jet-powered aerial target planes. The original contract for the Ryan robot planes, signed more than a year ago, was for approximately $2 million. The design and fabrication of the first experimental quantity has progressed satisfactorily, and delivery schedules have been established to permit flight testing and evaluation by the Air Force. The Air Force is charged with the technical responsibility for the development of the XQ-2. The high speed, radio-controlled target craft will be used for combat plane interception problems and for anti-aircraft and aerial gunnery training by the Air Force, Navy and Army. The first production units are now being assembled at Ryan's San Diego plant, and work on a second group of the pilotless aircraft is being started immediately, company officials said.

Navy Awards $29 Million Contract to Pratt & Whitney

The Navy Dept. recently announced the awarding of a $29 million contract to the Pratt & Whitney Aircraft Div., United Aircraft Corp., to supply Model R-4360-53 engines. At the same time, the Navy said that it had given the Lockheed Aircraft Corp. a $243,483 contract for checking out and testing electronic equipment in a government-owned PO-1W plane.

Fisher Body Sets Record in August

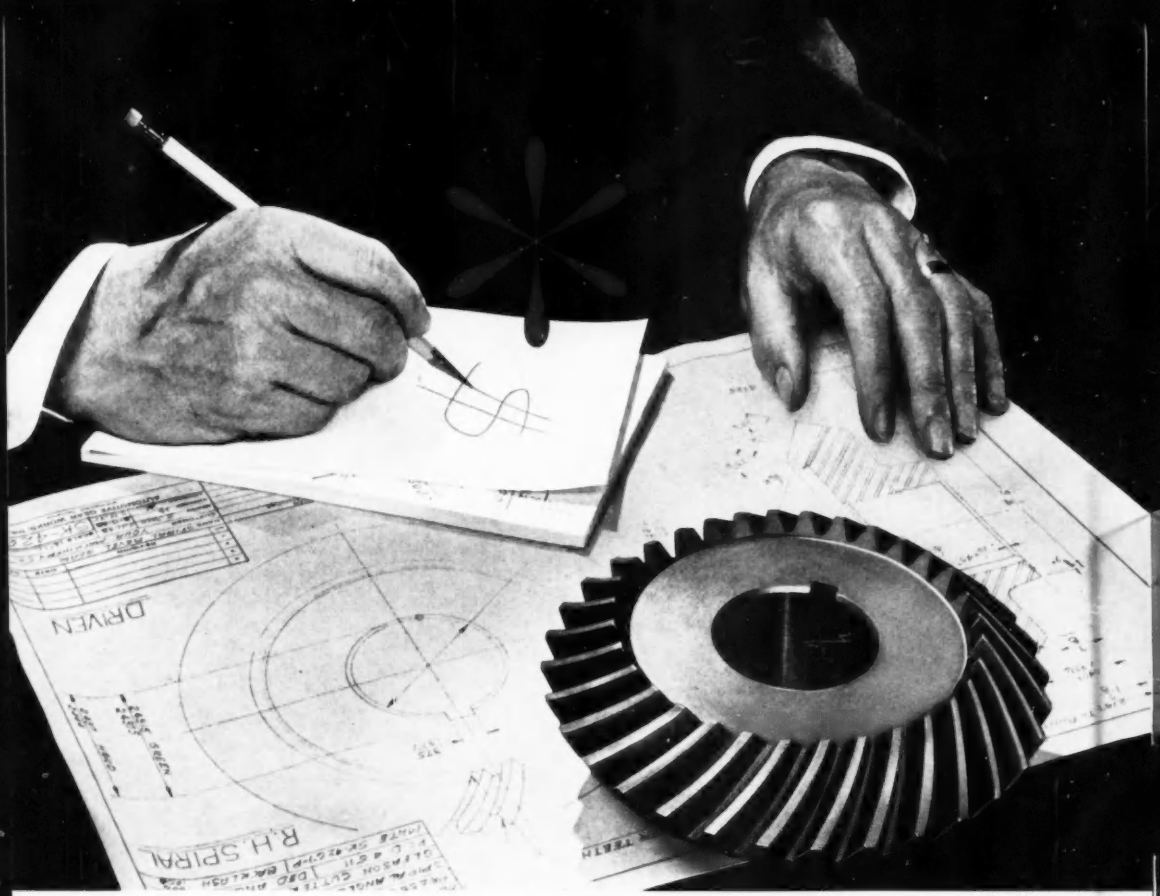
GM's Fisher Body Div. in August produced the greatest number of bodies for any month in its 41-year history, J. J. Cronin, vice president of GM and general manager of Fisher Body, disclosed recently. Fisher assembly and fabricating plants turned out 249,378 bodies last month, and included in this number were complete sets of body parts sent to GM's Buick-Oldsmobile-Pontiac Assembly Div. Three Fisher Body assembly plants, at St. Louis, Mo., Baltimore, Md., and Flint, Mich., have added second shifts within the past few months, and their added production also has swelled the August total.

United Kingdom's Aviation Exports on Rise

Although the United Kingdom's aviation exports thus far in 1949 are below the monthly average required to reach the target of £35 million (about $140 million) set for the entire year, the Dept. of Commerce says that there is every prospect that the goal will be achieved. Orders placed during January-June, and negotiations now reaching the signature stage, are expected to result in the purchase of more than 1000 British aircraft by overseas interests.

Mercury Sets New Mark at Bonneville Trials

Outstanding performance of the first annual Bonneville National Speed Trials, held on the salt flats near Wendover, Utah, was the two-way record run by the Xydias-Batchelor Mercury-powered streamliner. The specially built car covered the measured course at 189.745 mph, and was timed on a one-way dash at 193.54 mph. A Ford 60-hp engine was used in the car to win the Class A streamliner event with a run of 156.39 mph. A changeover to a Mercury engine in the same car resulted in the 189 mph figure to win the Class C streamliner run. The new Kurtis-Kraft sports car was timed at 142.515 mph.



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You're buying gears. You naturally want to know "*How much?*"

How much what?

How much they will cost per unit on delivery? That's *one* important consideration, but not the only one by any means.

How much will they save on installed cost?

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How much (or how little) will they crowd tolerance limits?

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And how much will the manufacturer respect your delivery requirements?

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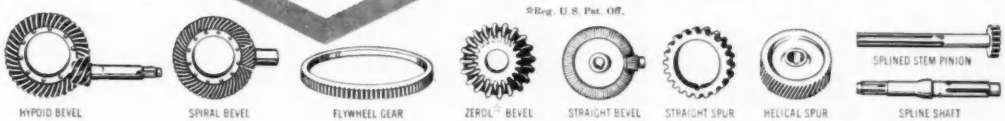

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CLUTCHES SINCE 1922

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CLUTCHES • RADIATORS • OIL COOLERS

BOOKS ...

The Economic Facts of Life, a series of four booklets—"The Why of Work"—"Buying With Hours"—"We Have What We Make"—"Progress Through Productivity"—by Merle D. Schmid and published by the Industrial Management Engineers, 111 W. Jackson Blvd., Chicago 4, Ill. Price of the four books is $2.25.

In four booklets the economic facts of American business are fully explained in language easily understood by the average American industrial foreman or worker. The author is President of the Chicago Chapter of the Society for the Advancement of Management.

The first of the series, "The Why of Work," explains in every day language how men produce and exchange goods and services. It emphasizes that production is controlled by man's wants. The only way prosperity can be obtained is that everyone produces something that other men want and are willing to purchase.

The second booklet "Buying With Hours" discusses money, cost and prices. The author relates that the important yardstick of the standard of living is not how much is earned or how much is paid for merchandise, but how many hours have to be worked to buy what is needed and wanted.

The third booklet 'We Have What We Make" discusses the pertinent fact that regardless of what promises are made by Union, Management or Government, we cannot have any more than we produce.

"Progress Through Productivity" is the fourth booklet. In this booklet the author discusses the reasons and methods employed in raising the United States to the economic leadership of the world. The reasons are given why both the freedom of enterprise in the United States and the incentives offered by our profit system have resulted in our high standard of living.

Each page of the four booklets is illustrated with cartoons picturing the pertinent facts of the text. The illustrations are reproductions of charts used in conference training classes in many Midwestern plants.

SCAVENGING OF TWO-STROKE CYCLE DIESEL ENGINES, *by Paul H. Schweitzer*, published by the *Macmillan Co., 60 Fifth Ave., New York*. Price $7.25.

This book is limited to the treatment of scavenging, as skill in design of scavenging is considered the key to successful two-stroke cycle engines. It is primarily for the designers of two-stroke engines and for development engineers whose job it is to bring performance of a prototype up to standard that this book has been written. To accomplish this purpose, use of higher mathematics is avoided except in appendixes, and complicated formulas have been frequently reduced to charts readily applicable to design problems. In addition, the application of formulas and charts is illustrated with numerous numerical examples.

The author has endeavered to bridge the gap between the research worker and the practical engineer by making available and simplifying advanced calculations for use by the designer, and also by describing trouble-shooting tests for the benefit of the test man.

PLANT PRODUCTION CONTROL (SECOND EDITION), by *Charles A. Koepke*. Pub. *John Wiley & Sons*, 568 pages. The second edition of this well known text is designed specifically to cover a broad background of problems of production planning and control. It features an expanded study of the planning and control functions; the addition of a large number of practical examples and problems; and a fresh approach to economic purchase and manufacturing quantities, using the same basic

(*Turn to page* 106, *please*)

Pension Problem

(*Continued from page* 98)

which would ultimately be sufficient for this purpose. The actuary advises us that if U. S. Steel annually sets aside in respect of past service the same amount as the $42.5 million required on account of future service it would take U. S. Steel about 35 years to catch up with the liability for past service cost.

The union's pension plan to be financially sound—and an unsound plan is intolerable—would cost U. S. Steel $85 million each year for the next 35 years. This is a total of three billion dollars with a subsequently continuing annual cost of $42.5 million, supposing that everything else relevant to the matter will be the same 35 years hence as it is now. These are staggering amounts. Moreover—and this is important because it is too often obscure to too many people—there is a multiplying effect on costs that approximately doubles even that cost.

What does **this mean?** The union is asking U. S. Steel retroactively to squeeze out of future receipts from customers—the public—past pension costs originating when each of our present employes began work one, five, ten, twenty-five, and in some cases, forty or more years ago.

In America a bargain is a bargain. It is unfair to make a bargain for the exchange of one's goods or services and then much later come along and demand that more be paid for those past goods and services. It is unfair to ask the public now to pay more for things it had fully paid for when they were purchased years ago—goods and services perhaps long since used up or discarded. This proposed retroactive bill for pensions must mean a higher price for everything everyone buys in the future.

As suggested at the outset the union demand contemplates many things, moral, economic, and political to which the union leaders appear oblivious. Yet these are matters charged not only with high public interest but also with vital significance to the whole lifeplan, individual freedom and security of employes.

The first grave policy matter to be resolved in the national interest is to determine where the responsibility for old age income should rest. Should it primarily rest with individual and family groups as it has historically in America; or should it be taken away from them in the hope that a generalized leaning upon each other will give better results? (The foregoing consists of extracts from a statement on Aug. 22 by Mr. Voorhees before the Presidential Steel Board in the matter of United Steelworkers of America, CIO, and various members of the steel industry.)


These new cars have 'Squirt' fittings
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More than 80% of all other new cars require only "slip-on" connections for water jets . . . just unscrew one nut on each side of the cowl.
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*Complete Washer installation made at factory
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● Car dealers and car buyers alike benefit when fittings for Trico Washer installations are included in engineering specifications.
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The Famous "Two Little Squirts"
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FULLY AUTOMATIC...NOTHING TO PUMP
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BOOKS . . .

(Continued from page 103)

formula for both. A sampling of the 25 main chapter headings is as follows: scope of production control; product design; process analysis; inspection; machine replacement; planning for production; inventory control; economic lot sizes; machine loads; measures of factory performance.

PATENT LAW FOR THE EXECUTIVE AND ENGINEER, by *H. A. Toulmin, Jr.; Research Press, Inc.*, Dayton, Ohio, 231 pp., illustrated.

As the title suggests, this book is written for executives and engineers who, because they are engrossed by the many problems of their crowded careers, do not have the time, nor perhaps the patience, to delve through lengthy legal phraseology in order to acquire a basic understanding of patent law. Cognizant of the readers' need for information in specific areas, the author divided the book into 22 chapters, each discussing a particular phase of patent law. How to Get a Valid Patent; When to Consult a Patent Attorney; What Can and Cannot Be Patented; and Who Owns the Invention—the Employer or the Employee?; are representative chapter titles that suggest the scope of this work. Examples of cases and court decisions are interjected at strategic points throughout the text.

The author is a corporation lawyer; he has represented many corporations in patent work. As an industrialist, inventor and head of a large industrial research laboratory, and as a trial lawyer, he has had over 35 years' experience in this field.

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NAMCO CIRCULAR CHASER VERS-O-TOOLS CAN CUT YOUR THREADING COSTS

FASTER • SIMPLER ACCURATE

Part — Valve Stem; threaded section 1" x 5".

Material — A-1140 Steel.

Vers-O-Tool — Standard 2⅜" Type DS, cutting 4 pitch thread.

Former Method — On turret lathe using lead screw, required 4 passes — box milling, two roughing threading cuts and one finish threading cut.

Vers-O-Tool Method — On same turret lathe with ground thread circular chasers made with extension pilots, requires one roughing cut, permitting lead screw to disengage after first 4 threads, and one finishing cut performed same way.

Result — Smoother threads, cut to lead screw accuracy in only *two passes* — a substantial saving in time and tool investment.

CLOSE TO SHOULDER — 20,000 PER GRIND

Part — Small Adjusting Screw 3/16" long; No. 0-80 U. S. Pitch Thread.

Material — A-1112 Steel.

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Lot Size — 100,000, three times a year. Even with exacting requirements for fine finish and close fit, production averages 20,000 between regrinds of circular chasers.

Design Advantage — DBS Vers-O-Tool provides a very sensitive adjustment between shank and body for starting the thread; quick-opening action permits threading close under head — within 1½ threads.

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Part — Bushing; A.N. Fine ½" — 20 thread.

Material — B-1113 Steel.

Vers-O-Tool — Standard 9/16" Type DR, on 1" RA Acme-Gridley Automatic.

Result — Class three thread; in excess of 125,000 pieces between regrinds of circular chasers.

For thread cutting with finer finishes — FASTER — there's a standard Namco Circular Chaser Vers-O-Tool to fit your requirements. Complete range of sizes and types shown in Bulletin D-49. Ask for your copy.

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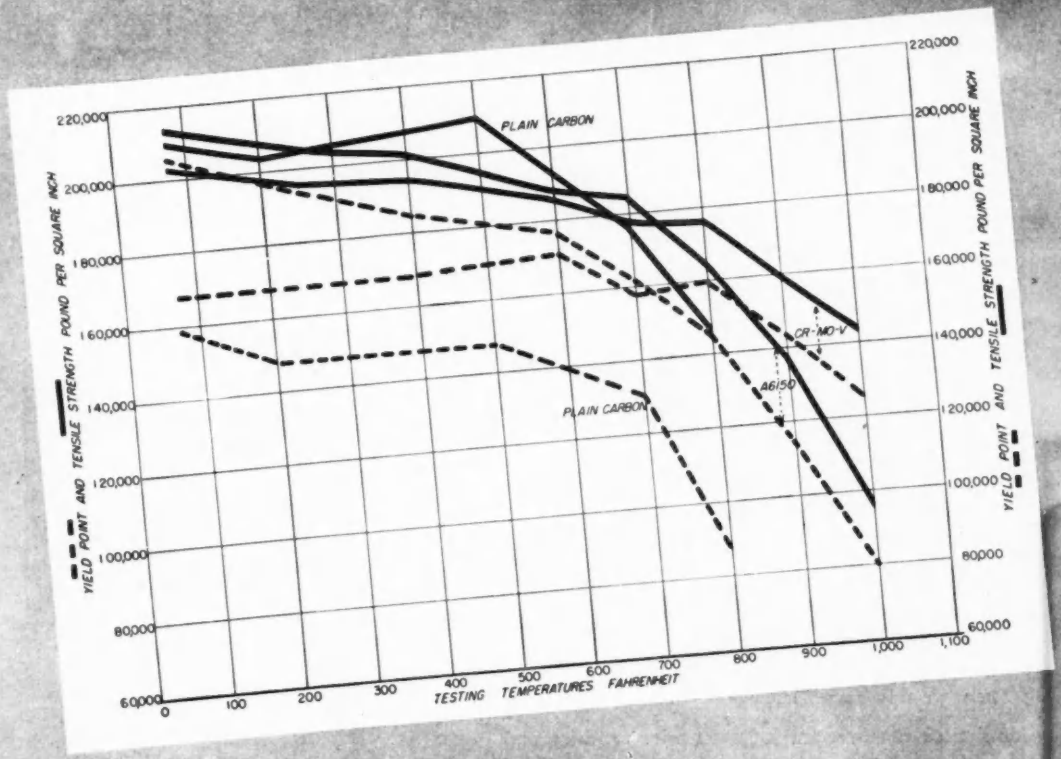

HIGH TEMPERATURE PROPERTIES

of Cr-V and Cr-Mo-V Spring Steels

SPRINGS FOR SERVICE at elevated temperatures require steels which resist softening and lowering of the yield point. Unless hardness and yield strength are stabilized by correct alloy additions to the steel, these properties deteriorate rapidly as the temperature is raised.

The chart above shows the yield point and tensile strength of three types of spring steel at elevated temperatures determined by standard short-time tension tests.

Springs of plain carbon steel are sometimes used at moderately elevated temperatures, although their lower yield values prevent them from giving service as satisfactory as that of the alloy spring steels.

Chromium-vanadium steel springs, such as AISI 6150, give better service at ordinary temperatures because of the higher yield point. In addition, they may be used at operating temperatures up to about 700° or 750° F because they retain high yield point values as the temperature is increased.

Chromium-molybdenum-vanadium steel was especially designed for springs operating at temperatures in excess of 750° F. It can be used for springs operating at temperatures as high as 850° F or even higher under some conditions. At 800° F, the yield point of this steel is still greater than that of plain carbon steel at room temperature.

If you have a problem in spring applications at elevated temperatures, our metallurgical engineers will be glad to help you solve it.

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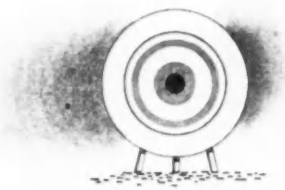

Customers tell us that AC devices have a "level" of quality that is uniformly above the average. That is no accident. It is our policy. We aim for superior quality. Then, we rely upon "know-how," on our almost unlimited resources and very extensive facilities, and on our many years of experience to produce that superior quality at equitable and attractive prices.

Sometimes, this policy costs us business. But, it has also brought us more than 300 manufacturing customers —most of whom we have served for years.

Check over the list of our products. If it includes devices you need, get in touch with our nearest office for information.

- AIRCRAFT SPARK PLUGS
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- CARBURETOR INTAKE SILENCER AND AIR CLEANERS
- CRANKCASE BREATHERS
- CRANKCASE VENTILATION VALVES
- DIE CASTINGS
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- FUEL OIL FILTERS
- FUEL PUMPS
- FUEL AND VACUUM PUMPS
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- GASOLINE STRAINERS
- IGNITION CABLE TERMINALS
- INSTRUMENT PANELS
- LUBRICATING OIL FILTERS
- OIL FILTER REPLACEMENT ELEMENTS AND CARTRIDGES
- AIR GAUGES
- OIL GAUGES
- RADIATOR PRESSURE CAPS
- REPLACEABLE AIR CLEANER ELEMENTS
- AUTOMOTIVE SPARK PLUGS
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- SPARK PLUG GAPPING TOOLS
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- SPEEDOMETER AND TACHOMETER DRIVE ADAPTERS
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NATIONAL OIL SEAL LOGBOOK

COMPENSATING FOR THE EFFECT OF CENTRIFUGAL FORCE ON THE SPRING TENSION OF OIL SEALS

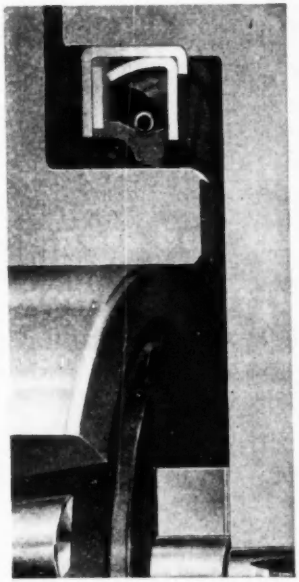

Fig. 1—Typical application where oil seal rotates with the mechanism.

In applications where large diameter oil seals rotate with the mechanism at high speeds, centrifugal force tends to lift the sealing member from the stationary sealing surface. Critical adjustment of spring tensioning in the oil seal is required in order to compensate for this effect.

The problem of adjusting spring tension so that zero leakage is achieved at full speed while at the same time keeping friction light when the machine is starting, could not be satisfactorily solved with any but the low torque synthetic seal. This problem was encountered in connection with the new adjustable-pitch propellers now being used on modern aircraft.

In such applications the oil seal diameters may run six, eight and ten inches. The seal press fits into the propeller and rotates with the propeller. Sealing lip contact is established with a stationary housing (see Fig. 1). Speeds may reach as much as 5,000 F. P. M.

Minimum contact, low torque SYNTECH* Sealing Member Design makes it practical to adjust tensioning far beyond normal.

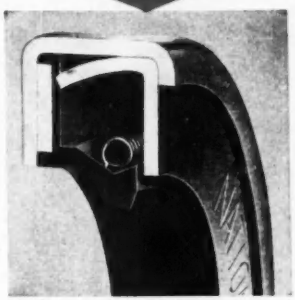

Fig. 2—Section of National Synthech rubber seal.

National 50,000-S Type Seals Solve the Problem

These problems are solved with regular design 50,000-S National spring-loaded Syntech oil seals. The basic design of these seals provides for almost "pin-point" contact between sealing lip and sealing surface (see Fig. 2). Under normal operation the spring tensioning can be very light. Thus with Syntech seals it is possible to achieve effective tensioning without causing excessive friction. At high speed, despite the action of centrifugal force, an effective seal is maintained.

The ability of National Syntech oil seals to withstand high speeds and provide zero leakage with light shaft contact made it possible to solve this problem. Perhaps you are encountering similar problems. For further information please contact the nearest National Oil Seal office.

*Syntech is the registered trademark for the National synthetic rubber compound.

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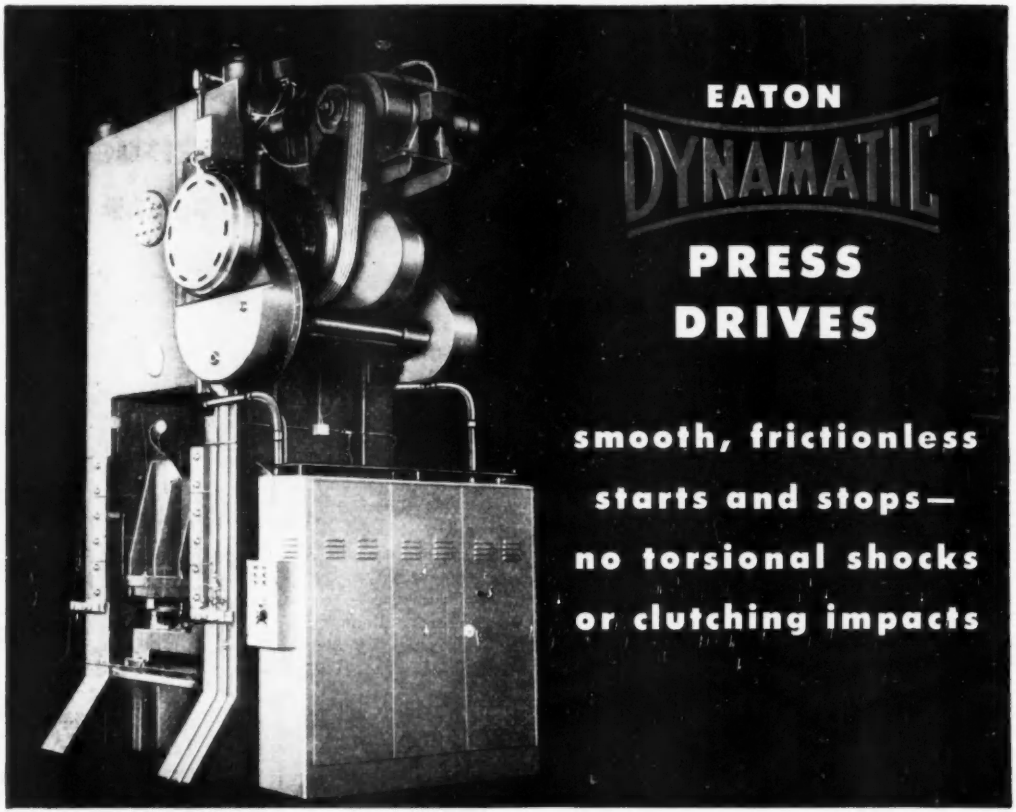

Dynamatic Electric Slip Couplings applied as punch press and welder press drives provide smooth starts and stops; better safety control; noiseless operation. They permit stopping of ram in any position, eliminate friction or jaw clutch maintenance; provide extremely rapid acceleration and deceleration. The ram can be started, accelerated to full speed, driven by ample torque, and then stopped at the top of the stroke within 5 or 10 degrees. Response to driving and braking effect is practically instantaneous. Inching is smooth, quiet, under precise control, while motor continues to run at full speed. Electronic control provides reliable ram speed and instantly available full torque. A selector switch makes available non-repeat single stroke, or continuous run operation.

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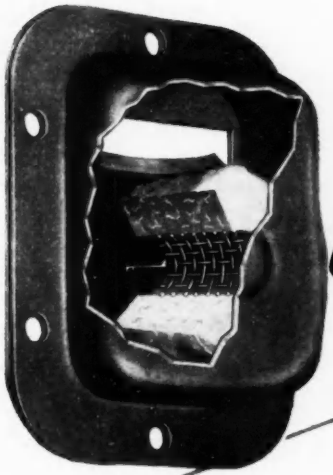

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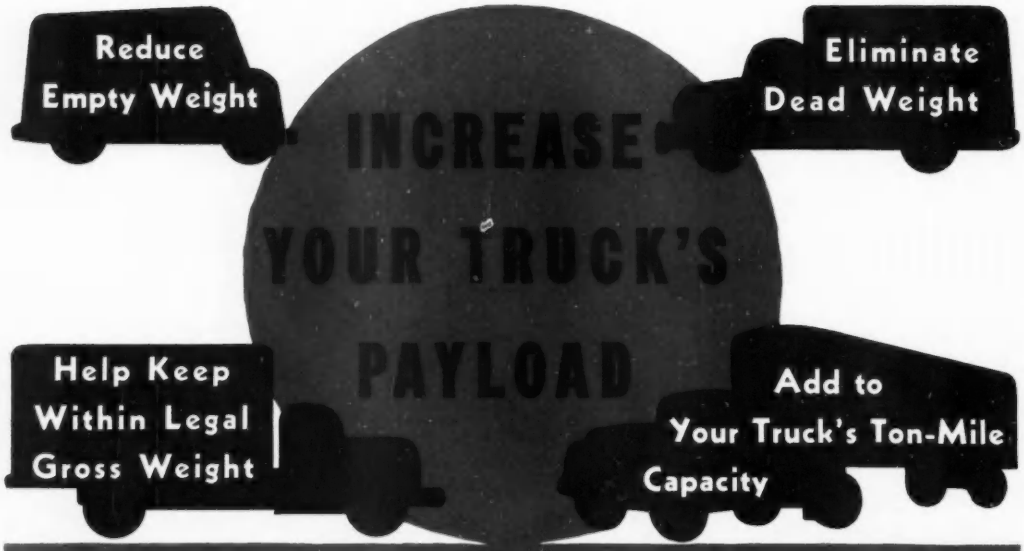

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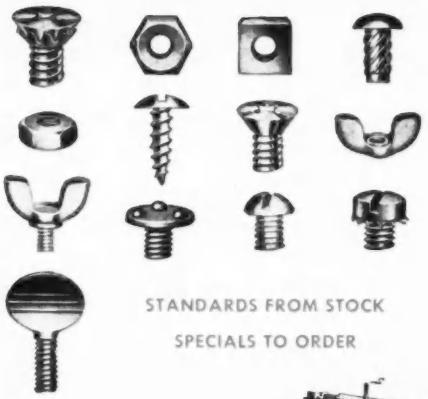

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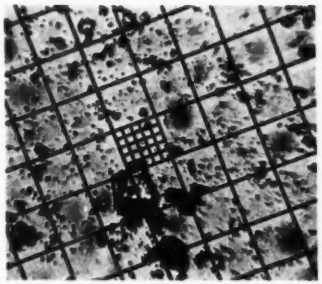
Here's why Purolator is standard on more engines than all other oil filters combined!



Filters Micronic Particles! In tests made by the Government on oil filters, with approved Test Dust containing graded dust ranging from one micron on up, Purolator filtered 97.8% on the very first pass-through.

5 Times Greater Filtering Area! The revolutionary accordion-pleated design of the Purolator Micronic Filter provides an area 5 times that of old-style filters. More than 10 feet of filtering surface in a 3¾ inch diameter element!

PERCENTAGES BY WHICH PUROLATOR MICRONIC ELEMENT EXCELLED COMPETITIVE TYPES

COMPETITOR	IN AVERAGE DIRT RETENTION PUROLATOR LED BY:
A	199%
B	220%
C	113%
D	547%
E	164%
F	619%
G	255%
H	339%
I	318%
J	193%
K	237%
AVERAGE PUROLATOR SUPERIORITY	290%

Resists Crankcase Acids! Purolator's micronic element is made of cellulose specially impregnated with plastic. Its resistance to heat, warping, *and destructive crankcase acids* has been conclusively proved both in immersion tests (above) and in actual use.

Removes 200% More Abrasives! In competitive tests against comparable filters . . . Purolator led in average dirt retention by 290% (as shown above) because Purolator filters particles as minute as .000039 of an inch, and has greater filtering area.

and that's not all!

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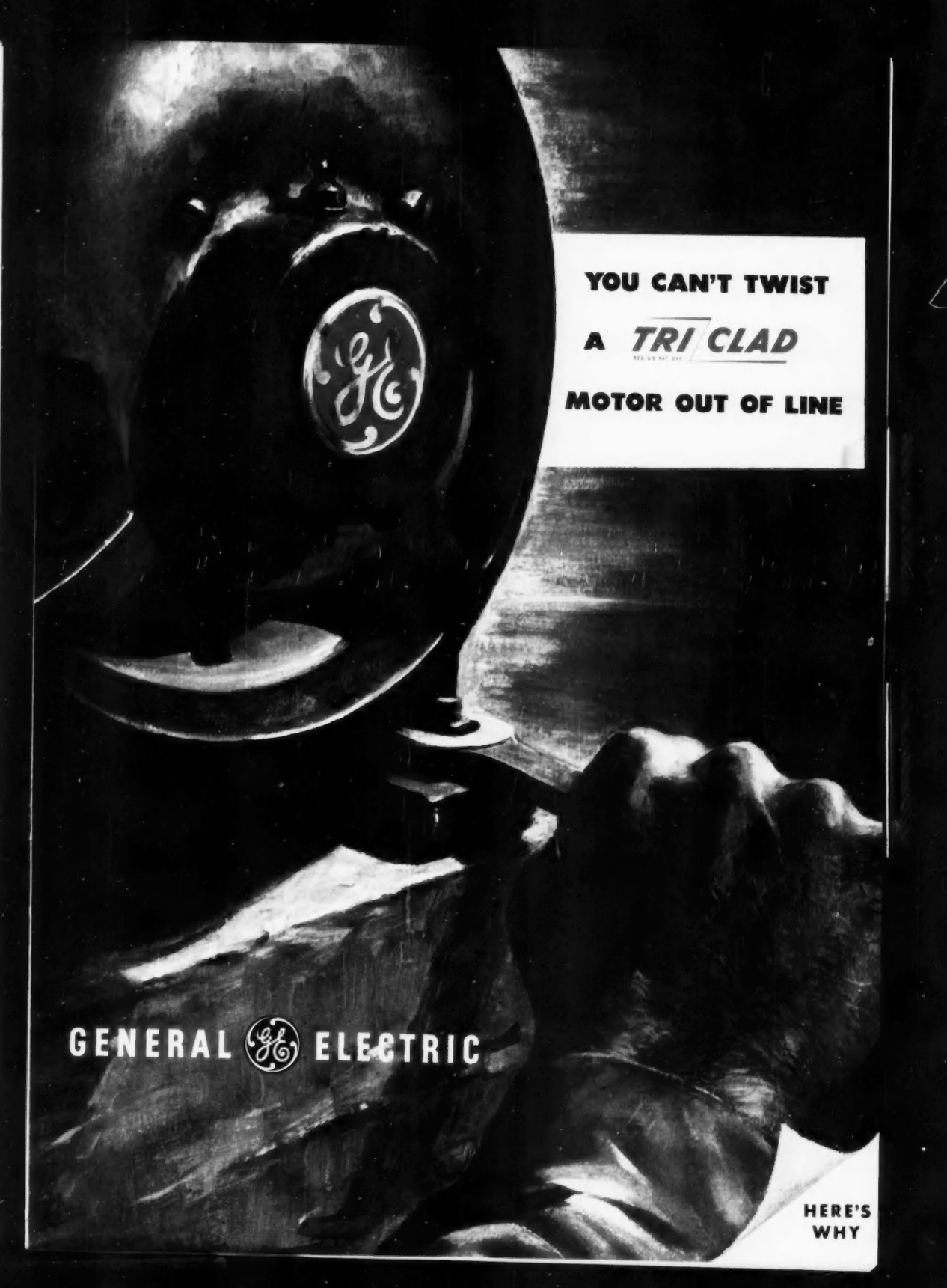
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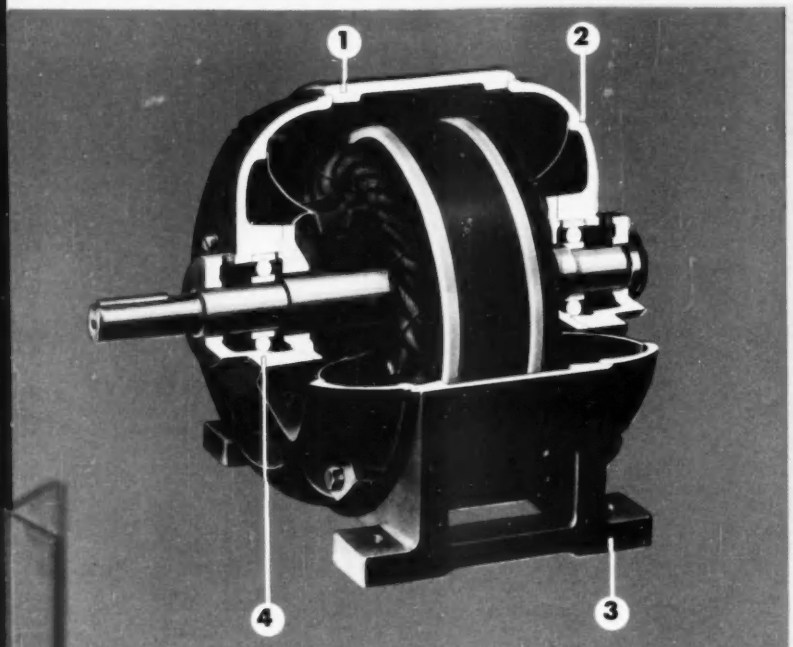

Look at the solidity of a Tri-Clad's thick-section cast-iron frame (1) and heavily reinforced end shields (2) . . . its heavy integrally cast feet (3). Do you wonder we say "Tri-Clad gives you structural strength and rigidity no other general purpose motor can match"? Notice, too, the *completely enclosed* bearings (4). A Tri-Clad motor will run safely without relubrication for years — as long as any general-purpose motor you can buy. Yet it's grease-gun easy to lubricate if you ever need to.

You can't twist a TRI CLAD motor out of line

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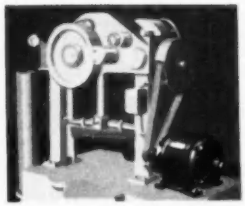
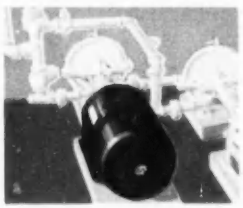
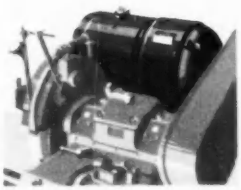


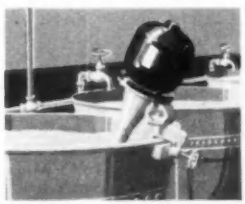
G-E open (drippproof) induction motors for constant-load, constant-speed applications. From 1 to 2000 hp.



G-E totally enclosed motors for outdoor operation, in abrasive dusts, or corrosive fumes. From 1 to 1000 hp.



G-E Type ACA induction motors for adjustable speeds—provide 3 to 1 speed range. From 3 to 75 hp.



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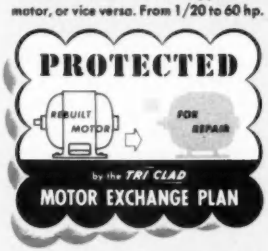
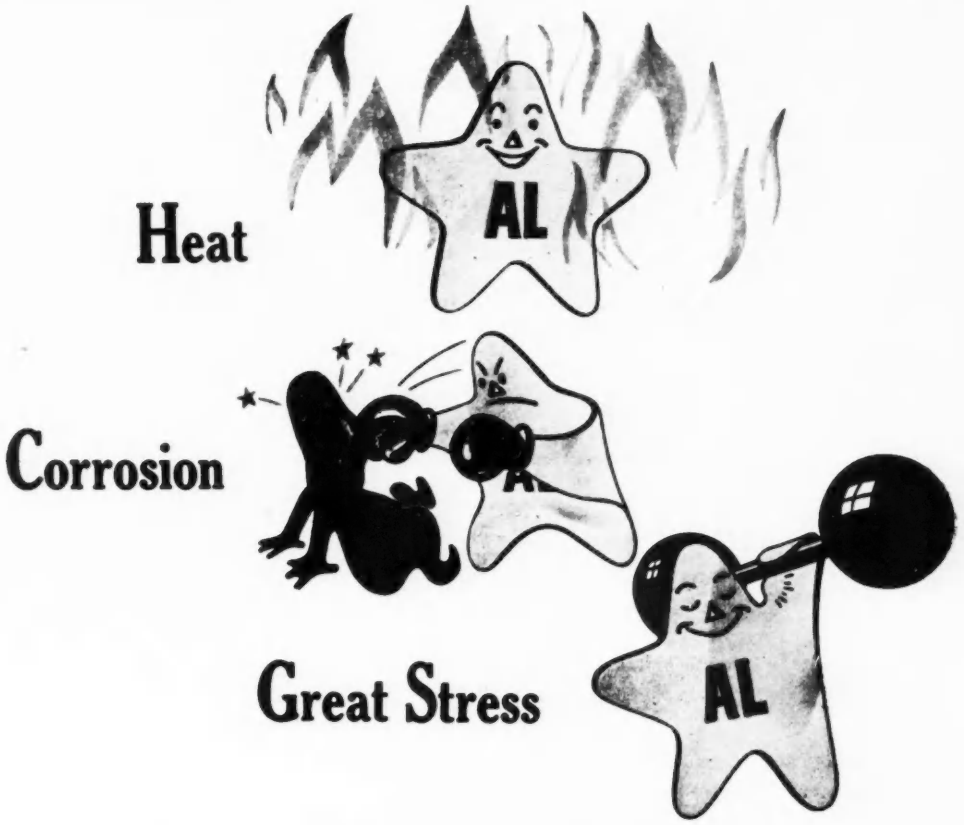


Look for this **EXTRA** on the motor you buy!



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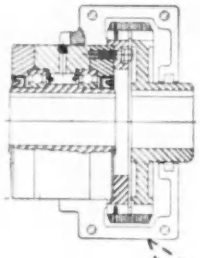

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Morse-Formsprag Clutch Couplings combine full complement Morse-Formsprag over-running clutches and Morse flexible couplings. The over-running clutch automatically engages when torque is applied—disengages when torque ceases. The automatic action is instantaneous to protect equipment in the event of failure of either engine. Morse flexible couplings compensate for misalignment.

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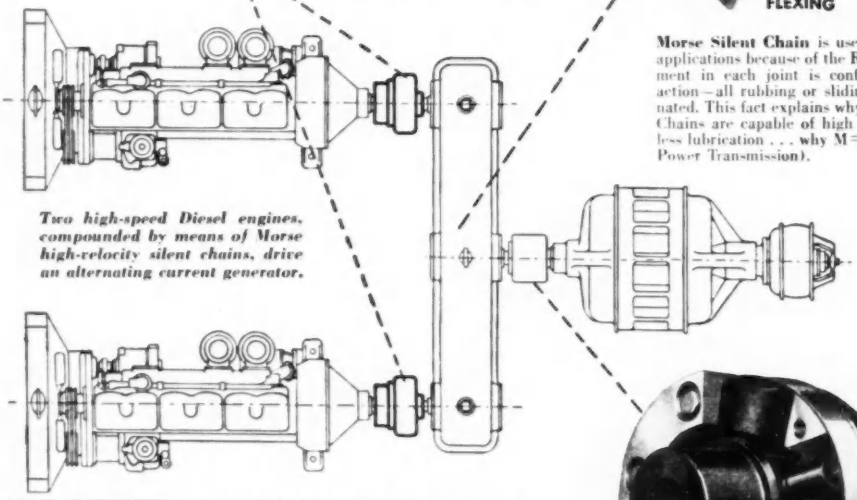
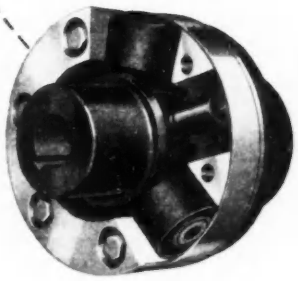


Two high-speed Diesel engines, compounded by means of Morse high-velocity silent chains, drive an alternating current generator.



Morse Morflex Radial Couplings with resilient, preloaded rubber "biscuits" are ruggedly constructed, and torsionally flexible. Morflex Radial Couplings compensate for misalignment, absorb shock and dampen vibration. These qualities result in smooth, vibration-free power transmission. M = PT (Morse means Power Transmission).

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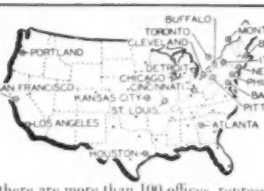

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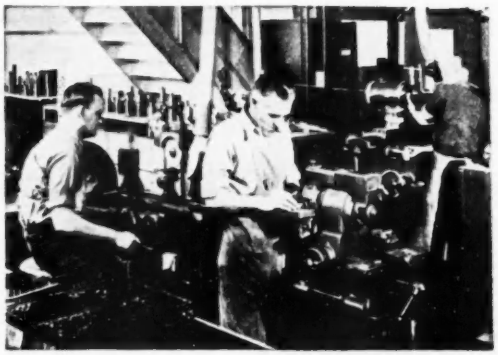
Carboloy "Triple C" Plan pays dividends at New Britain-Gridley

Coordination of carbide tool design and application at New Britain-Gridley, brought about through the "Triple C" Plan, keeps machine down-time at a new low. On this draw-boring application, for example, all carbide-tipped tools are pre-set in cat heads to exact dimensions. For various sized bores, operator merely changes heads on arbor, and has no tool setting to do.



The centralized grinding phase of Carboloy's "Triple C" Plan at New Britain-Gridley resulted in an almost-overnight one-third drop in tool breakage. Carbide-tipped cutting tools are employed on a majority of cutting, facing and boring operations, and have helped lower manufacturing costs, increase production and reduce tool replacement costs.

The New Britain-Gridley Machine Division of the New Britain Machine Co. slashed new tooling costs *by one-third* since the adoption of a plant-wide Coordinated Carbide Control Plan. Read what it has done for them and what it can do for you.

COORDINATION of all phases of carbide tool use within the plant, under the direction of a carbide supervisor, is helping New Britain-Gridley lower its break-even point, a factor of concern to all manufacturers.

Under this unique coordinated carbide control plan, the design, maintenance and application of carbide tools are standardized wherever possible. This standardization, applying to about 95% of all single-point machining operations at New Britain-Gridley, speeds up application of tools on the job, keeps engineering costs at a minimum and simplifies the purchase of cutting tools on an economical, scheduled basis.

Why not investigate and find out how "Triple C" can fit into your production operations . . . bringing you amazing savings in time and costs while increasing your production and profits?

"Triple C" tool standardization allowed over 95% of New Britain-Gridley's turning, boring and facing work to be done by only twenty-nine standard carbide-tipped tools, some of which are shown here.

CARBOLOY COMPANY, INC.

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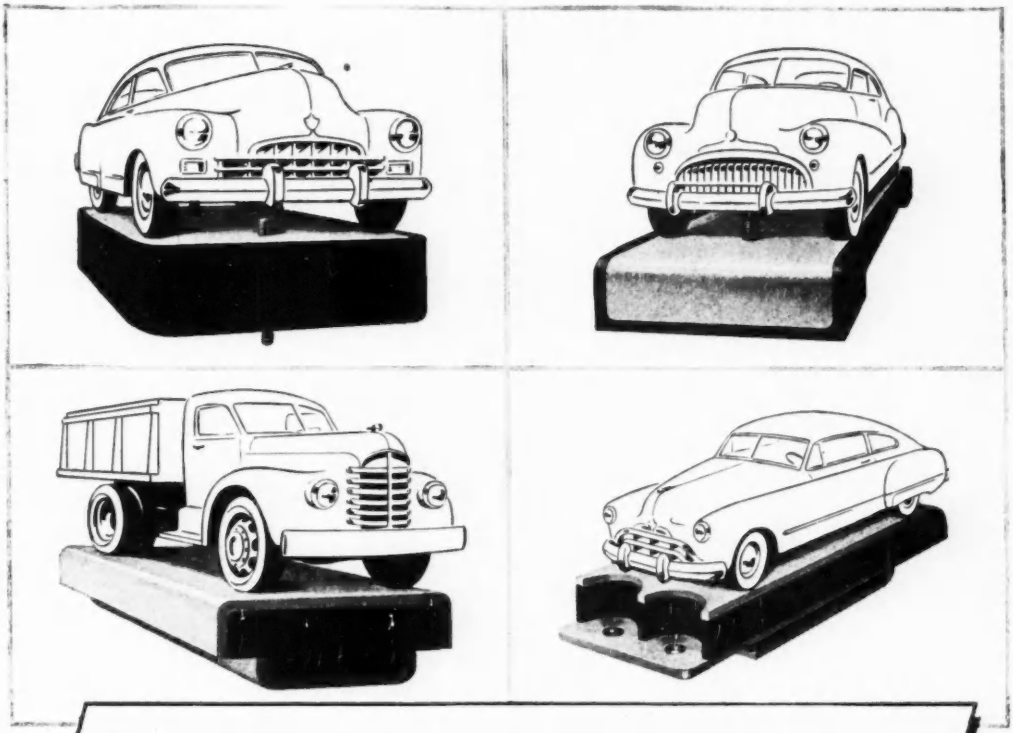

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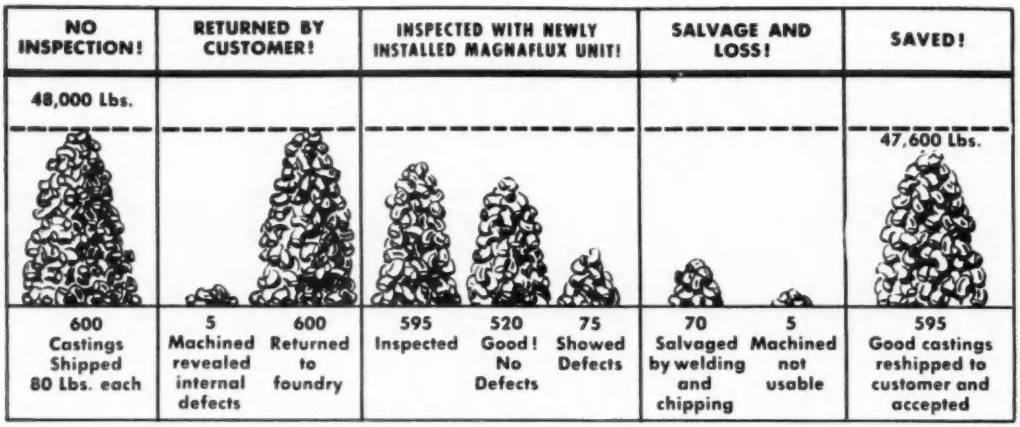
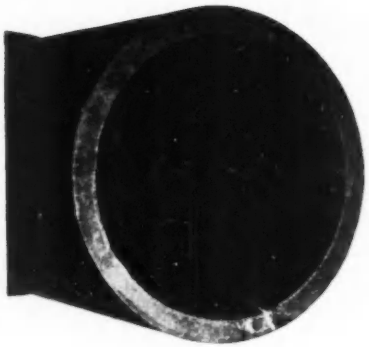


SAVED! 99% of a 24-ton rejected order



Not only are non-visible external defects revealed, but indications of the sub-surface shrinkage cracks (inside this casting) are equally as easy to bring into prominence—with Magnaflux inspection.

● A new Magnaflux* Unit, recently installed in a prominent midwest foundry, practically paid for itself on the first job. This foundry completed and delivered 600 large steel castings—24 tons!—to one of their preferred customers. Machining the first five castings uncovered large subsurface shrink cracks, which prompted the customer to return the entire lot as rejects. Shipping costs both ways were a complete waste.

At this point, the newly installed Magnaflux Unit was used to test the 600 castings to find 525 good, 75 with the defects (including the above five). By chipping and welding all the remaining 70 were fully repaired, again Magnafluxed to assure final soundness, and reshipped to be accepted and used by the customer.

The chief inspector of this foundry now, having more experience using Magnaflux, gives it his highest approval as a regular production foundry tool. He uses it for gating and casting control of all new castings which they make.

Perhaps Magnaflux Magnetic Particle Inspection Units are what you need, to overcome manufacturing losses and strengthen control of quality in your plant. Write for full particulars today.

**Magnaflux, Reg. U. S. Pat. Off., a trademark of Magnaflux Corporation applied to its equipment and materials for magnetic particle inspection.*

MAGNAFLUX CORPORATION

M A G N A F L U X C O R P O R A T I O N

5904 Northwest Highway, Chicago 31, Illinois

NEW YORK • DALLAS • DETROIT • CLEVELAND • LOS ANGELES

***Export Distributor:* Curtis Wright Corp.** ***In Canada:* Williams and Wilson, Ltd.**

Partial Shipments Only...

Every shipment that leaves the Twin Disc Factory is incomplete . . . only because the *service* that goes with each sale is delivered later . . . whenever and wherever it may be needed.

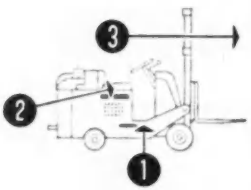
Twin Disc maintains five factory branches and 47 Parts Stations, strategically located throughout the country, to provide speedy and efficient service.

It is this policy of complete follow-up service that has given Twin Disc products the broad acceptance they enjoy among leading equipment manufacturers. Specify Twin Disc on your next power application.

TWIN DISC CLUTCH COMPANY
Racine, Wisconsin
(Hydraulic Division, Rockford, Illinois)

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

every handling job is easier with TOWMOTOR MH!



1-LOW STEP-UP 2-WIDE SEAT
3-GOOD VISIBILITY

—Towmotor Efficiency Features

Your driver is seated at his important task . . . with plenty of leg room, seat room and "see" room to do a more efficient, faster, better job.

Another development pioneered by Towmotor is the exclusive design which permits greater freedom and ease of operation for the fork lift truck operator—increasing his alertness and efficiency in the safe handling of loads up to 15,000 lbs. Compare Towmotor with any other lift truck and you will see why Towmotor's outstanding features make every **M**ass **H**andling job easier, faster, safer. Write for a copy of the "Operators Guide." Towmotor Corporation, Div. 45, 1226 E. 152nd St., Cleveland 10, Ohio. Representatives in all Principal Cities in U. S. and Canada.

TOWMOTOR
THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

MIDLAND'S *Complete Packaged* AIR BRAKE KITS

With 7.3 Cu. Ft. Compressors

Available for all popular makes and models. Field installations—everything furnished to make a complete installation. Instructions and installation diagram in each kit.

AIR BRAKE KIT

For Tractor Installation order:

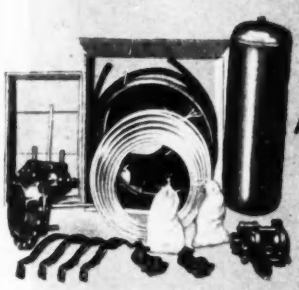
- *STRAIGHT TRUCK KIT*
- *TRACTOR TO TRAILER OUTLET KIT*
- *AIR HAND CONTROL VALVE KIT*
- *AIR HORN KIT (SINGLE OR DUAL)*

Also Available: AIR CONVERSION VALVE KIT.
10 CU. FT. COMPRESSOR.

VACUUM BRAKE KITS . . .

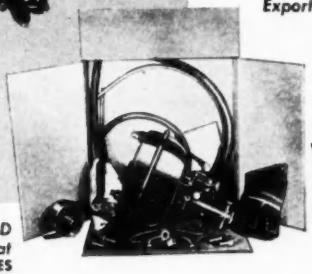
For all makes and models from ½ ton up. Contain Midland's HY-POWER units. Furnished in sizes to suit the vehicle.

- *STRAIGHT TRUCK KIT*
- *TRACTOR TO TRAILER OUTLET KIT*
- *VACUUM HAND CONTROL VALVE KIT*
- *SYNCHRONIZING VALVE KIT*

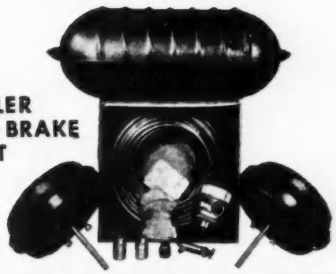


TRAILER AIR BRAKE KIT

THE MIDLAND STEEL PRODUCTS CO.
6660 Mt. Elliott Avenue • Detroit 11, Mich.
Export Department: 38 Pearl St., New York, N. Y.



HY-POWER VACUUM BRAKE KIT



TRAILER VACUUM BRAKE KIT

See Your Nearest MIDLAND Authorized Distributor or Branch at
1367 SO. FLOWER ST., LOS ANGELES
6105 E. CLAY ST., PORTLAND, ORE.

MIDLAND

POWER BRAKES

AUTOMOBILE AND TRUCK FRAMES

BUS DOOR CONTROLS

Kelvinator buys more CLEVELANDS

Cleveland Presses have been used for years in the production line of The Kelvinator Division, Nash-Kelvinator Corporation, Grand Rapids, Michigan. Because of the excellent performance record they have established—several new Clevelands have just been added.

These new Cleveland double-action, toggle-type presses are being used to draw compartment doors, panels and crisper pans. The performance of these presses more than meets the requirements of Kelvinator's rigidly controlled production line.

We at Cleveland are proud to be able to list the Nash-Kelvinator Corporation as another of the many satisfied users of modern Cleveland Presses.

Listed below are the specifications for this new Cleveland #2T-72-200 double-action, toggle-type press. Many important design changes have been incorporated that offer production at a low cost.

A-2348

CONDENSED SPECIFICATIONS

Operation: Double geared, Twin drive, electrically controlled air operated friction clutch, air counterbalance to blankholder. (Air counterbalance to both slides optional)

Adjustment: Blankholder manual, inner slide by motor up to 3".

Lubrication: Gears in oil bath, Toggle draw links and bearings by oil pressure flow.

Capacity inner slide	200 tons
Capacity blankholder	120 tons
Stroke of inner slide	23"
Shut height with adj. up	37"
Bed area	F to B 45"—R to L 72"

Equipped with 35 ton pneumatic cushion for complicated deep drawing or to provide the equivalent of a third action for shallow reverse draws.

For complete information send for our folder 95. If you require presses for a special metal forming problem, feel free to call on our experienced engineers for consultation.

PUNCHING TOOLS & DIES

OFFICES AT:
NEW YORK....CHICAGO
DETROIT....PHILADELPHIA
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THE
CLEVELAND
PUNCH & SHEAR WORKS CO.
U.S.A.
Established 1880

FABRICATING TOOLS

CLEVELAND 14, OHIO

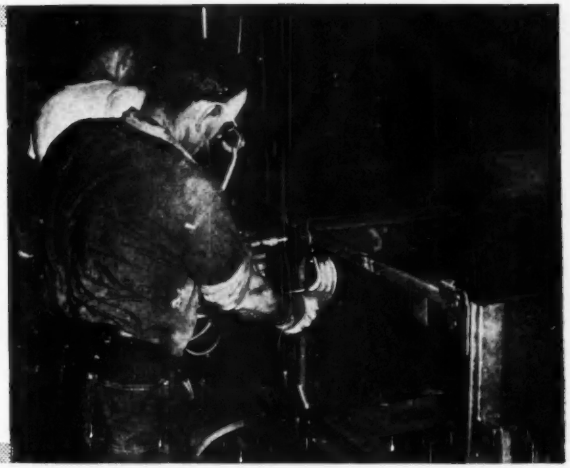
• • • • • • **POWER PRESSES** • • • • • •

Mallory Fluted Welding Tips

Increase Production and Cut Costs!

Cross-section of Fluted Tip* used for spot-welding corner braces on 8 cu. ft. refrigerator cabinet at International Harvester's Evansville Works.

**Patent Applied For.*



International Harvester Makes Big Saving

Spot-welding operations on International Harvester 8 cu. ft. refrigerators were found in some cases to be *electrode eaters.* Harvester engineers discovered that after changing to Mallory Fluted Tips they were able to cut downtime and increase production per tip *by six times!*

On one operation they were averaging 1,000 spots per tip . . . *after changing to Mallory Fluted Tips they obtained an average of 6,000 spots.* Six times more welds—yet the fluted tip is a Mallory standard and *costs no more!*

The Fluted Tip design—another Mallory exclusive—has set many new production records because of its far greater cooling efficiency. It can do the same in your shop.

Why accept anything else? When you can buy improved performance—longer life—fewer interruptions—all at standard prices, you owe it to yourself to switch to Mallory Fluted Tips. Get started now!

In Canada, made and sold by Johnson Matthey & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Resistance Welding Tips, Holders, Dies, Rod and Bars, Castings, Forgings

SERVING INDUSTRY WITH

Capacitors Rectifiers
Contacts Switches
Controls Vibrators
Power Supplies
Resistance Welding Materials

P. R. MALLORY & CO., Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

TIMED TO TODAY'S TREND

Redmond 1/10th HP DC MICROMOTOR

UP TO ½rd HP ON INTERMITTENT DUTY

It's in line with the latest trend in the automotive industry toward larger heating, ventilating and defrosting units. It's ideal for electro-mechanical and electro-hydraulic devices.

Scientifically chamfered field pole design, cushion mounted armatures and pre-seated brushes provide smooth, quiet operation. Large oil reservoirs and direct feed lubrication assure long life. Self-centering bearings are individually fitted to the shaft, and a strong steel case protects the mechanism and maintains alignment.

Here you get tested efficiency and long life, a product backed by the reputation of millions of lower power Redmond direct current Micromotors that have given years of top performance under rugged conditions all over the world.

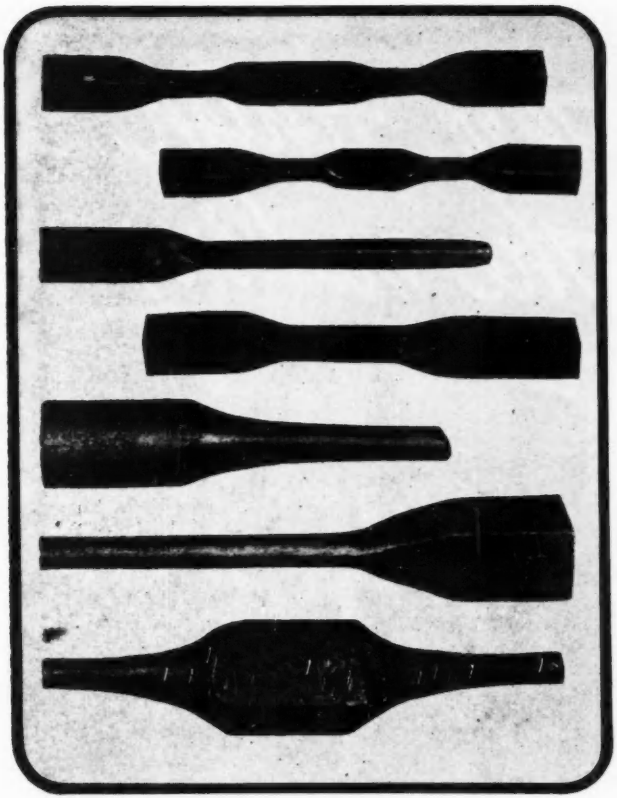
Write for full information today.

Redmond COMPANY, INC.

OWOSSO, MICHIGAN

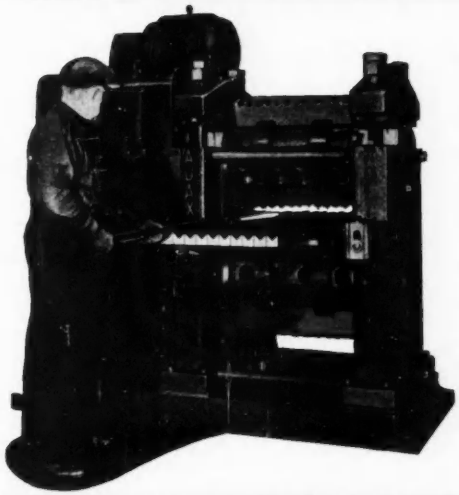
Expanded Facilities • Prompt Deliveries • Service before and beyond the sale

REDMOND



AJAX ROLLS

For all sizes and types of FORGING BLANKS



Available in six sizes, AJAX Wide Adjustment Forging Rolls have capacities for pre-rolling forging blanks ranging from the smallest automobile valve rocker arm to the largest airplane propeller. And backing these, AJAX engineers have a priceless wealth of experience in design of roll grooves and pre-rolled forging blanks acquired during the more than fifty years since AJAX introduced these Rolls into the forge shop.

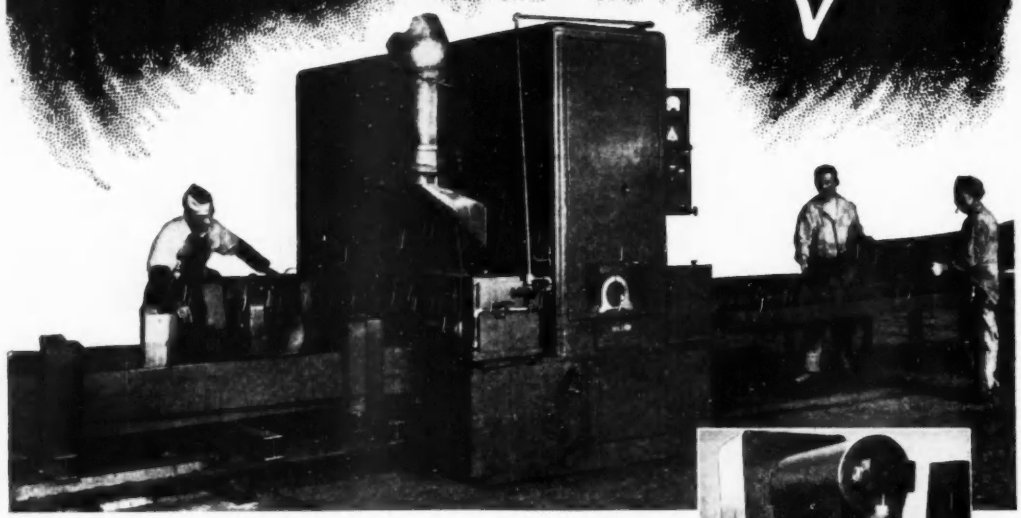
Die width to accommodate the considerable series of grooves required for abnormally great, cross-sectional reductions or several groups of grooves for blanks with different metal distribution, gives these machines wide general utility.

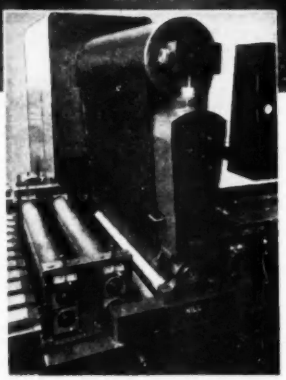
The advantages accruing in the press forging or drop forging of accurately proportioned, pre-rolled blanks through metal saving, longer die life, greater output and stronger forgings warrant your investigation.

WRITE FOR AJAX BULLETIN 91-A
And Additional Information

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
110 S. DEARBORN ST. CHICAGO 3, ILLINOIS
DEWART BUILDING NEW LONDON, CONN.

A smoother finish is in the making





Hill 2-Roll Vertical Grinding Machine with cover removed, showing 126" endless abrasive belt, pneumatic belt centering device, power driven rubber covered feed rolls, etc.

Steel Sheets for auto body door panels, instrument panels, quarter panels and deck lids are being surfaced on a 60" wide HILL 2-Roll Vertical Abrasive Belt Pinch Roll Type Grinding and Polishing machine. A smoother finish is assured, hand operations are reduced and production is greatly increased. Machines of this type can be placed in series for line polishing and are built in various widths. When writing for information, please indicate size and specifications of material to be processed. Bulletin GP-3 gives additional details.

THE HILL ACME COMPANY

1201 WEST 65th STREET • • • CLEVELAND 2, OHIO

"HILL" GRINDING AND POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

Disston Hot Rolled Shape 11.16 lbs. per ft.

This 3.35 lbs. per ft. is out

- **You don't buy it**
- **You don't machine it**

You can see where the use of Disston Special Hot Rolled Shapes saves production costs and material. These basic savings are stepped up by Disston ability to give you uniform accuracy in all dimensions and remarkably clean finish.

Do you run into difficulty on any hot rolled shapes you use now? Disston skill and facilities will come to your rescue.

What new special shapes will be practical for you? Disston will work them out to save you time and money right from the start.

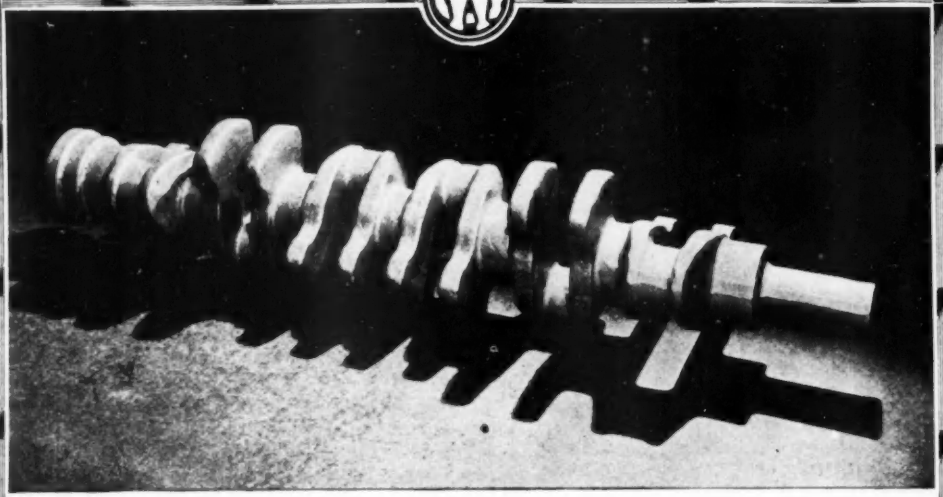
You can effect distinct economies with special shapes in electric, open hearth and Bessemer grades, hot rolled by Disston.

A few of the many Disston Special Hot Rolled Shapes are shown below, full size.

DISSTON HOT ROLLED SHAPES

WHEN YOU BUY A DISSTON PRODUCT YOU BUY DISSTON STEEL SKILL and SERVICE

HENRY DISSTON & SONS, INC., 931 Tacony, Philadelphia 35, Pa., U. S. A.



Diesel Power has become a major factor in the truck and tractor field. Here again Wyman-Gordon crankshafts are the standard of the industry.

Crankshaft Specialists since the birth of the internal combustion engine and today the largest producer of crankshaft forgings, Wyman-Gordon furnishes die forged cranks of all types and in weights up to a thousand pounds.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS - - - DETROIT, MICHIGAN

Molder: Plastic Fabricators, Inc.

BAKELITE NEWS

NO. 7

NOTES FROM BAKELITE CORPORATION ON BETTER, FASTER, LOWER COST PRODUCTION WITH "BAKELITE" PLASTICS

$313 Savings Per Machine Through use of BAKELITE Phenolics!

❶ Here's how one manufacturer obtained a better product at considerably lower cost. BAKELITE Phenolic Plastics replaced die-cast metal for the four dispensing rings of the new "Kenro" ice cream vending machine. Direct savings totalled $304 for the four rings. Additional savings of $9.12 per machine were obtained by replacing eight shaft bushings of soft metal that cost $1.20 each, with BAKELITE Phenolic molded bushings costing only 6¢ each. The plastic parts contributed further indirect savings by reducing the weight of the machine 30 pounds, thereby lowering shipping costs, and by the elimination of several machining and finishing operations.

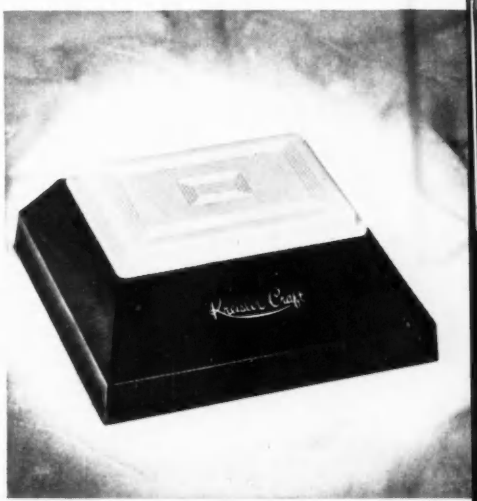
It may pay you, too, to redesign your products or component parts around BAKELITE Phenolic Plastics.

PACKAGES that Sell and Keep on SELLING

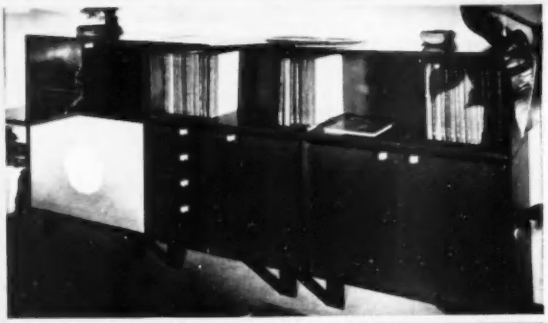
❷ Everyone gains from the new BAKELITE Styrene Plastic packages designed by Walter Dorwin Teague for Kreisler-Craft men's jewelry. Not only do these packages sell goods, but they continue to build goodwill through their re-use value to the consumer. They appeal to the retailer because they can be converted instantly into eye-catching displays, or can be nested on dealers' shelves for mass display effect. Above all the use of BAKELITE Styrene Plastics enabled Kreisler to develop a package with exceptional quality appeal, at a cost that was well within the normal margin allotted for packaging these popular priced jewelry items.

BAKELITE Styrene Plastics are a "natural" for packaging. They are light, strong, lustrous, available in an unlimited range of colors, transparent, translucent, and opaque. They are rapidly and inexpensively fabricated by injection molding into intricate shapes, and give fine, clear cut reproductions of mold details. Let us show you how to package profitably with plastics.

Molders: Cowan-Borden Corp., General Electric Co.



MORE BAKELITE NEWS ON NEXT PAGE



Bakelite

TRADE-MARK

PLASTICS

BAKELITE CORPORATION

BAKELITE CORPORATION
Unit of Union Carbide and Carbon Corporation UCC
30 East 42nd Street, New York 17, N.Y.

Design Changes Are Easy with Versatile, Adaptable Plastics!

Check coupon below for information on specific subjects illustrated. For general information, write for copy of Booklet G-8, "A Simplified Guide to BAKELITE and VINYLITE Plastics."

BAKELITE CORPORATION, Dept. B-22
30 East 42nd Street, New York 17, N. Y.

Please send information on subjects checked below:

- ☐ 1. BAKELITE Phenolic Plastics
- ☐ 2. BAKELITE Styrene Plastics for Packaging
- ☐ 3. BAKELITE Phenolic and Urea Resin Adhesives
- ☐ 4. BAKELITE Styrene Plastics for Toys
- ☐ 5. BAKELITE C-10 Resins for Enamels

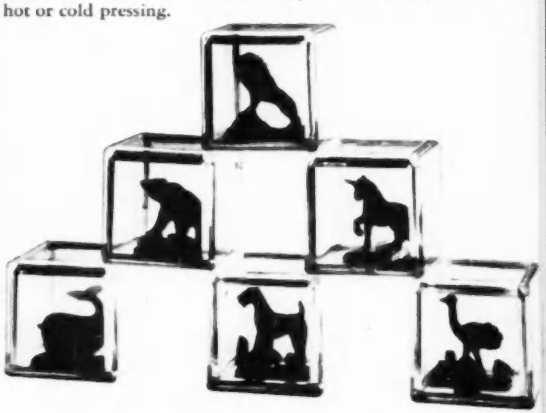
Your Name ..... Title .....

Your Company .....

Address ..... City ..... Zone ..... State .....

LOWEST COST Resin Glue for Top-Quality Furniture

❸ Heard about BSC? It stands for built-in storage components—a progressive new idea in furniture design and construction that bridges the gap between portable furniture and prefabricated storage wall systems. Built by Herman Miller Furniture Company from designs by George Nelson, the BSC furniture units illustrated owe their durability to good design plus BAKELITE BCU-22 Urea Resin Glue. The glue is employed in the manufacture of the fine plywood panels, and also in assembling the various furniture components. But the best news of all is that these quality bonds are obtained at the lowest possible cost because BCU-22 is the most economical of all synthetic resin adhesives available today. It is suitable for either hot or cold pressing.



ORIGINALITY Pays Off With BAKELITE Styrene Plastics

❹ Originality of design applied to colorful strong, BAKELITE Styrene Plastics has brought wide acclaim to these unique "Kusan" toys. Illustrated are the basic transparent blocks containing sealed-in animals and other figures that appeal to little tots. These blocks can be assembled in various ways to provide roller-pull toys, rattles, and other equally intriguing play items. They are strong enough to take a beating, are smooth, washable, and non-shattering. They are designed and molded by Kusan, Inc., Plastics Division, who produce a great variety of Styrene Plastic toys in transparent, translucent and opaque effects.

GOOD NEWS for Product Finishing Departments

❺ Latest advances in protective coatings are color-stable, white and light-tinted enamels based on BAKELITE C-10 Resins. For example, Resin BJS-502 can be formulated into enamels that exhibit several unique qualities of particular importance to product finishing technologists. A single coat, either dipped on or sprayed on, provides high gloss and appearance equivalent to multiple coats of lacquer, yet the enamel air dries tack free in 5 to 15 minutes. When finishing schedules call for additional coats, the enamels can be recoated any time from 1 to 96 hours or later without lifting, when the recommended solvent balance is followed.

These coatings can also be baked rapidly to produce hard tough films with excellent color retention. Use the handy coupon to obtain further information.

Camera crew on location filming the electric-furnace sequence for industrial motion picture, "Alloy Steels"

"ALLOY STEELS"

Film Story of Controlled Production of Alloy and Special Steels

Bethlehem has completed a sound motion picture describing the production of alloy steels.

The film explains every phase of the process, beginning with the raw materials. It shows both electric and open-hearth furnaces in operation, as well as hot-rolling, billet preparation, heat-treatment, and cold-drawing. It deals extensively with highly-developed laboratory methods for maintaining quality on a mass-production basis.

"Alloy Steels" is intended for both technical and general audiences. It takes 45 minutes to show, and is available in either 16 or 35 mm. It is especially suitable for showing before such groups as:

Manufacturing and Industrial Companies
Jobbers and Dealers
Civic and Service Clubs
Colleges and Technical Schools
Technical Societies and Trade Associations

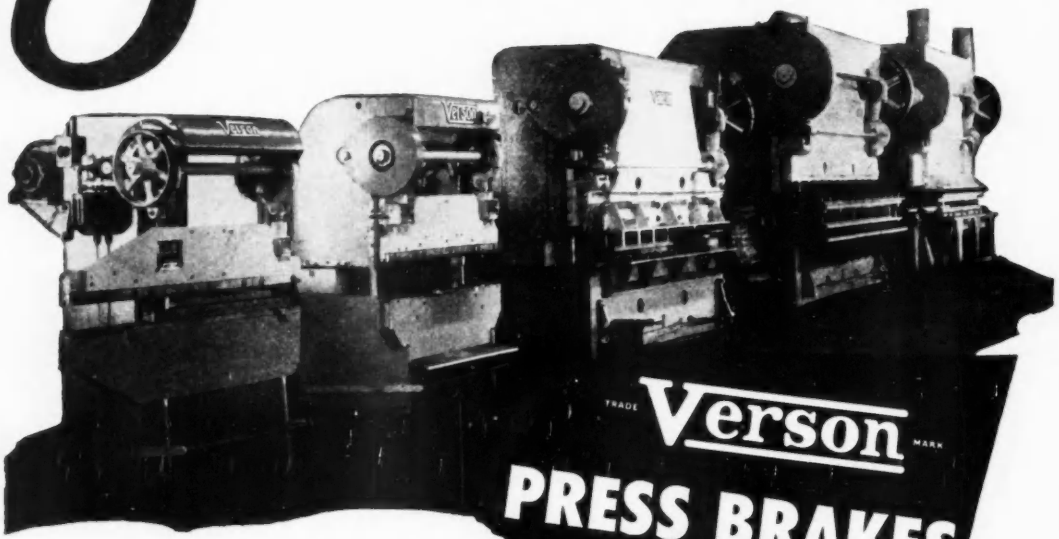
There is no charge for the use of *"Alloy Steels"* other than return shipping cost. Requests should be made at least three weeks prior to date needed. Address your requests to:

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

5 correct answers to the problems of metal forming and punching



TRADE Verson MARK
PRESS BRAKES

Verson offers three basic groups of press brakes — Junior Series, Intermediate Series and Major Series—to meet every requirement for forming, bending, coping, notching, punching.

JUNIOR SERIES PRESS BRAKES are compact, economical units for lighter jobs and have capacities up to 45 tons.

INTERMEDIATE SERIES PRESS BRAKES are for the in-between jobs that are too heavy for a Junior Brake and not heavy enough to warrant a Major Brake. Capacities up to 60 tons.

MAJOR SERIES PRESS BRAKES are heavy-duty units that offer the utmost in performance, precision and production. They are available in a broad variety of sizes, capacities and styles to meet the most exacting demands. Capacities up to 35-ft. by 1-inch plate.

ALL VERSON PRESS BRAKES, regardless of size incorporate the most advanced features to assure speed, accuracy and power. Send an outline of your requirements and we'll be pleased to make specific recommendations.

Do you have this helpful literature?

VERSON DIE MANUAL. Bulletin DM-48, is an 88 page handbook of press brake dies, punching attachments, press brakes and related information.

MAJOR SERIES PRESS BRAKE CATALOG. Bulletin MPB-48 rev., gives full design details and specifications for Verson Major Series Press Brakes.

JUNIOR AND INTERMEDIATE CATALOG. Bulletin JIB-49, gives full design details and specifications for Verson Junior and Intermediate Series Press Brakes.

Any or all of these bulletins are available on request. Please specify bulletin number of those desired.

VERSON ALLSTEEL PRESS COMPANY

9307 South Kenwood Avenue, Chicago 19, Illinois — Holmes Street and Ledbetter Drive, Dallas 8, Texas

A Verson Press for Every Job from 60 Tons Up

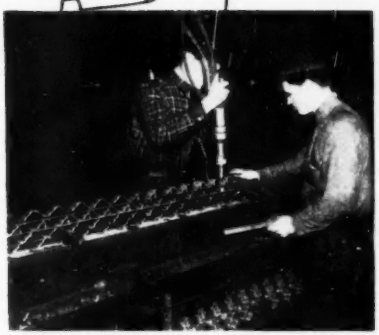
BLANKING PRESSES • FORGING PRESSES • DRAWING PRESSES • HYDRAULIC PRESSES
PRESS BRAKES • DIES • DIE CUSHIONS

What's your RIVETING Problem?

HOT AIR FURNACE SHELLS—At the touch of a button, this 25-ton Hannifin "Hy-Power" Hydraulic Riveter advances...forms rivet...automatically retracts. Time: approximately 2½ seconds!

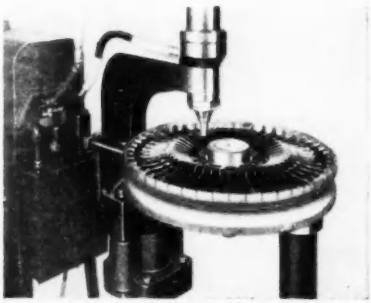
HANNIFIN *has the answer!*

FAST . . . efficient . . . economical Hannifin "Hy-Power" Hydraulic Riveters pay for themselves in unbelievably short periods of time. More work with less effort, no noise. Push button control! Capacities up to 100 tons. You can't beat the Hannifin "hydraulic squeeze" method of riveting for STRENGTH and HIGH PRODUCTION RATES. For prompt, dependable help in getting tooled-up for efficient production, take advantage of Hannifin's vast store of experience in designing and building hydraulic and pneumatic equipment for all branches of industry. Send for complete information.

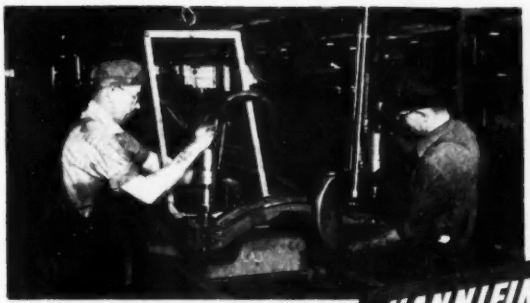


STEEL FLOOR GRATINGS—Production line assembly methods are made practical by portable "Hy-Power" riveters designed to reach hard-to-get-at rivets.

HANNIFIN CORPORATION
1143 So. Kilbourn Ave., Chicago 24, Illinois
AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES



HYDRAULIC TORQUE CONVERTERS—This 17½-ton Hannifin stationary riveter is used in fabricating runner assemblies for hydraulic couplings.



AUTOMOTIVE FRAMES—Hydraulically squeezed cold rivets are unexcelled for strength, dependability, and economy!

HANNIFIN "Hy-Power" RIVETERS

IT PAYS TO SPEND MONEY FOR COST-CUTTING EQUIPMENT!

Boost your employee-participation in the Payroll Savings Plan and you boost your production!

You are skeptical? Then consider this logic: The more U. S. Savings Bonds an employee holds, the more secure he feels. The more secure he feels, the greater his peace of mind—the more contented he is with his job. Results? Less absenteeism, less labor turnover, fewer accidents. *End result: increased production.*

And you needn't depend on theory alone. For those company benefits of the Payroll Savings Plan are borne out in the experience of more than 20,000 companies promoting the Plan.

LONG-RANGE BENEFITS, TOO

Bond sales spread the national debt, thus increasing our national economic security. And, of course, what's good for that is also good for you and your business.

The individual Bond Buyer gets back $4, when his Bonds mature, for every $3 he invested. That's a boon for him, and—multiplied by millions of Bond holders—represents a huge backlog of purchasing power that will help assure national prosperity through the years ahead.

IT'S EASY TO BOOST PARTICIPATION

1. See that a top management man sponsors the Plan.

2. Secure the help of the employee organizations in promoting it.

3. Adequately use posters and leaflets and run stories and editorials in company publications to inform employees of the Plan's benefits to them.

4. Make a person-to-person canvass, once a year, to sign up participants.

These first four steps should win you 40-60% participation. Normal employee turnover necessitates one more step:

5. Urge each new employee, at the time he is hired, to sign up.

Nation-wide experience indicates that 50% of your employees can be persuaded to join—without high-pressure selling. All the help you need is available from your State Director, U. S. Treasury Department, Savings Bond Division. He is listed in your phone book.

The Treasury Department acknowledges with appreciation the publication of this message

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council

The HOUDAILLE* HUSKY is a Balanced SHOCK ABSORBER

ALL Operating Parts are Huskier for BALANCED Low-Pressure Performance on BOTH Compression and Rebound Strokes

You can't simply make a few parts of a shock absorber larger than those of a standard unit and still have balanced performance under all conditions.

That is why *all* working parts of the Houdaille Husky are larger and stronger. The areas of piston *and* rod are increased proportionally for balanced, low-pressure operation on *both* compression and rebound strokes. That is why Houdaille Huskies give a balanced ride—why they are noiseless and last so much longer—why they have the strength and stamina to perform under the hardest possible use-age without undue strain or wear.

The Husky is your answer to dependable ride-control on the heavier cars or those sold for tougher than normal service in either domestic or export markets. Huskies are interchangeable with standard units without drilling or special fittings and without sacrifice in collapsed or extended length.

Complete details on this lastest of fine Houdaille Shock Absorbers are yours for the asking.

55½% LARGER ROD for COMPRESSION

57½% LARGER PISTON for REBOUND

That's what we mean by **BALANCE**

*Say "Hoo-dye"

HOUDAILLE-HERSHEY CORPORATION
HOUDE ENGINEERING DIVISION
BUFFALO 11, NEW YORK
America's Pioneer Builder of Hydraulic Shock Absorbers

You can depend on premium performance from any product that bears the name

AMERICAN BOSCH

'ROUND-THE-CLOCK battery care

When heavy electrical loads or tough operating conditions keep batteries run-down, they need special care. American Bosch Special Service Generators are engineered and built to do just that. With extremely low cut-in, they reach full output quickly — keep batteries up to charge night and day, right 'round-the-clock. Models up to 60 amperes are available for 6- and 12-volt systems. Write today for complete performance data and details.

Investigate the GRB 45 Ampere Generator

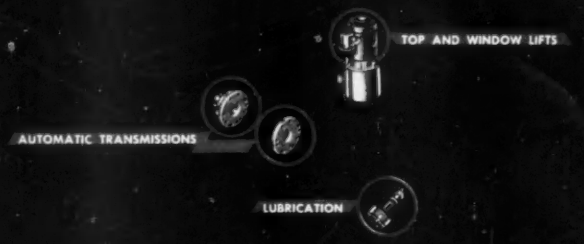
With idling engine, 6-volt model delivers 12-15 amperes

Full output at 10-15 m.p.h.

Adequate pulley size minimizes belt wear

Basic List Price Only $135 Complete

AB AMERICAN BOSCH CORPORATION · SPRINGFIELD 7, MASSACHUSETTS



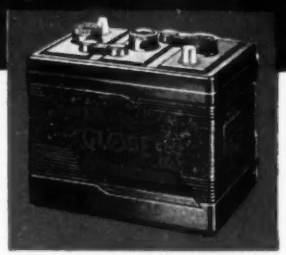
EATON ROTOR PUMPS

Provide High Efficiency at All Speeds, and Silent Operation for a Wide Range of Automotive, Farm Implement, and Miscellaneous Applications

Eaton engineers will welcome an opportunity to discuss the possible application of Eaton Rotor Pumps to products now in production or in design.

EATON MANUFACTURING COMPANY
CLEVELAND, OHIO
Pump Division
9771 French Road · Detroit 13, Michigan

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGTITES SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS



GLOBE-UNION ENGINEERING BUILDS BETTER BATTERIES

For 38 years Globe-Union engineering and production methods have built better batteries and made possible noteworthy technical advances in battery development. Today the dependable performance of the modern motor car is due in no small measure to the dependable performance of modern Globe-Union batteries, widely used for both original equipment and replacement. In replacement service, the toughest of all battery service, Globe-Union quality, durability and "Spinning Power" for split-second starting are known 'round the world.

GLOBE-UNION

GLOBE-UNION INC.

MILWAUKEE, WIS.

Atlanta, Ga. • Cincinnati, Ohio • Dallas, Texas • Los Angeles, Calif. • Medford, Mass.
Emporia, Kan. • Memphis, Tenn. • Mineral Ridge, Ohio • Oregon City, Ore. • Philadelphia, Pa.

Let SAGINAW *carry your steering load*

Saginaw Steering Gear Division stands ready and able to supply steering equipment to meet the most exacting requirements of passenger cars, buses, trucks, or farm tractors. You can count on Saginaw for steering fitted to your particular needs . . . and you can depend on Saginaw to provide an unfailing supply to meet your production schedules.

Back of Saginaw steering equipment stands a long record of successful specialization in design, engineering and manufacture. Now, Saginaw's know-how and enlarged capacity are at your call . . . to serve you as satisfactorily and faithfully as they have long served the makers of America's foremost automotive vehicles and farm tractors.

• *There's a Saginaw Steering Gear of the Type That Suits Your Needs*

Saginaw has led in improving conventional types of steering gears and in developing new and advanced types. You can choose the type that best suits your requirements—worm and sector, roller tooth, recirculating ball, or hydraulic power. They cover a complete range of ratios and capacities.

GM PRODUCTS

Saginaw

STEERING GEAR DIVISION

STEERING GEAR ASSEMBLIES • STEERING LINKAGE ASSEMBLIES
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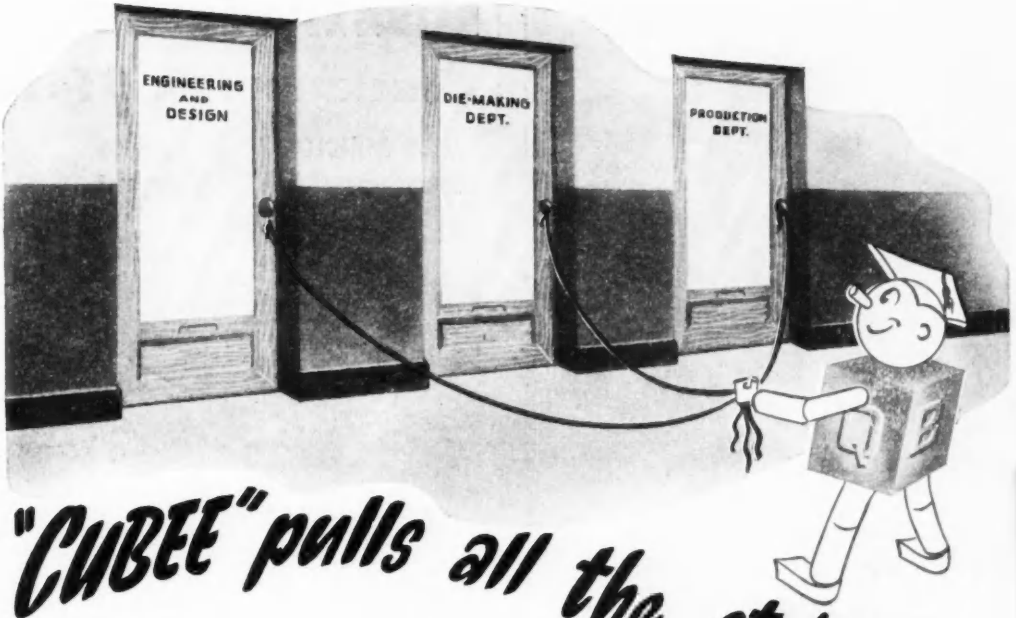


"CUBEE" pulls all the strings...

HE TAKES COMPLETE CONTROL

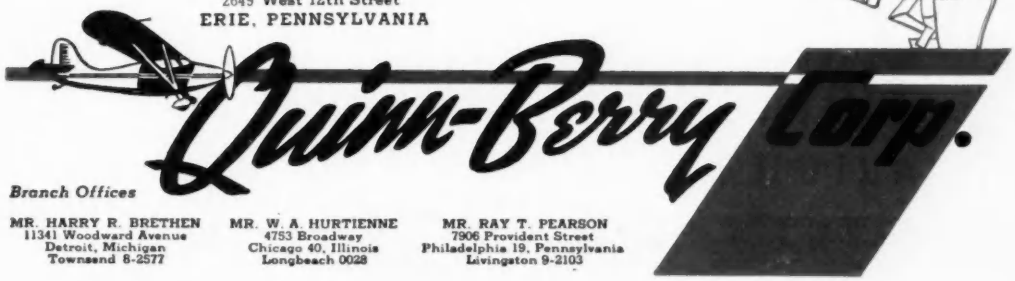
Doesn't it always simplify matters when you can "dump" a problem into someone's lap and forget it? That's why "Cubee" has a big lap. He takes complete control. All the facilities needed to supply you with molded plastics parts are under one roof . . . *our* roof. We design the molds—we make the molds—we mold the plastics product. Nothing is "farmed-out". The complete responsibility is ours. And why shouldn't it be? That's our business—Plastics! The next time you need molded plastics products, call "Cubee". We'll consult with your engineers and designers and come up with the answers to your problems.

Write, wire or phone for further information.

QUINN-BERRY CORP.
2649 West 12th Street
ERIE, PENNSYLVANIA

Q-B Says:

"If you're sweatin' and stewin'
'Cause you need plastics parts
Just call in Quinn-Berry
Then *our* worryin' starts!"



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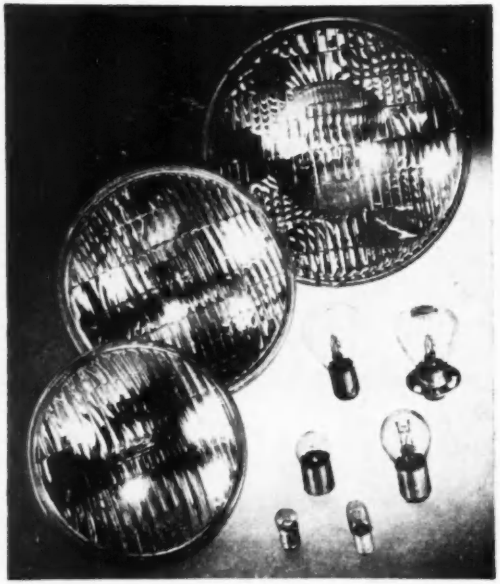


There's a TUNG-SOL LAMP *for Every Socket on Every Car*

The high quality of TUNG-SOL Lamps has made them the preference of automotive manufacturers for both initial equipment and replacement. TUNG-SOL was among the earliest suppliers to the automotive industry to appreciate and satisfy its requirements . . . Uniform product, produced in quantity, enabling production line assembly and universal service of cars.

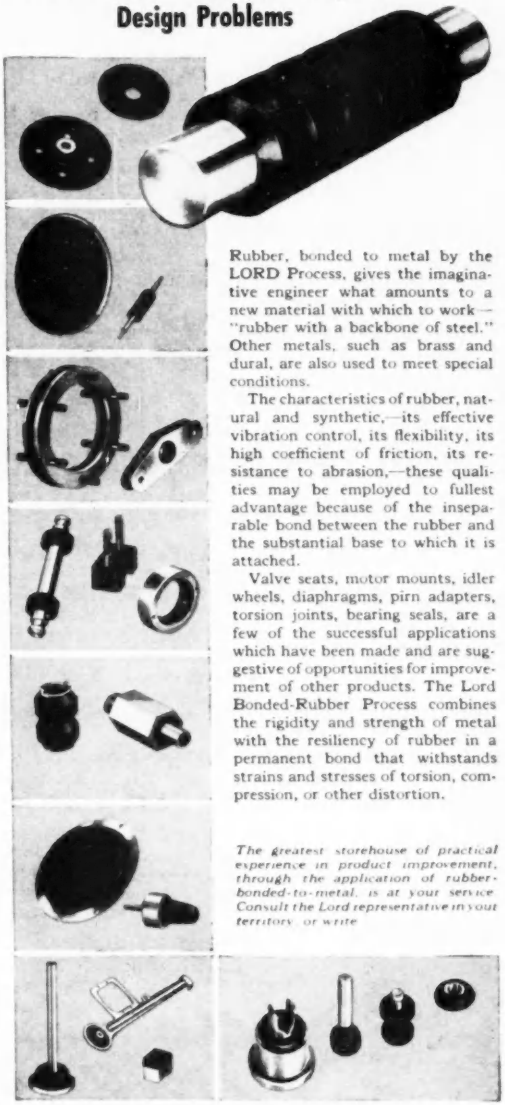
Specify: **DEPENDABLE TUNG-SOL LAMPS FOR ALL TYPES OF CARS, TRUCKS OR BUSES**

TUNG-SOL
AUTO LAMPS

TUNG-SOL LAMP WORKS INC., NEWARK 4, N. J., Sales Offices: Atlanta Chicago • Dallas • Denver • Detroit • Los Angeles • Newark • Philadelphia
ALSO MANUFACTURERS OF ELECTRON TUBES AND FLASHERS

RUBBER . . . with a backbone of STEEL

LORD BONDED-RUBBER Products Solve Some of Industry's Toughest Design Problems



Rubber, bonded to metal by the LORD Process, gives the imaginative engineer what amounts to a new material with which to work—"rubber with a backbone of steel." Other metals, such as brass and dural, are also used to meet special conditions.

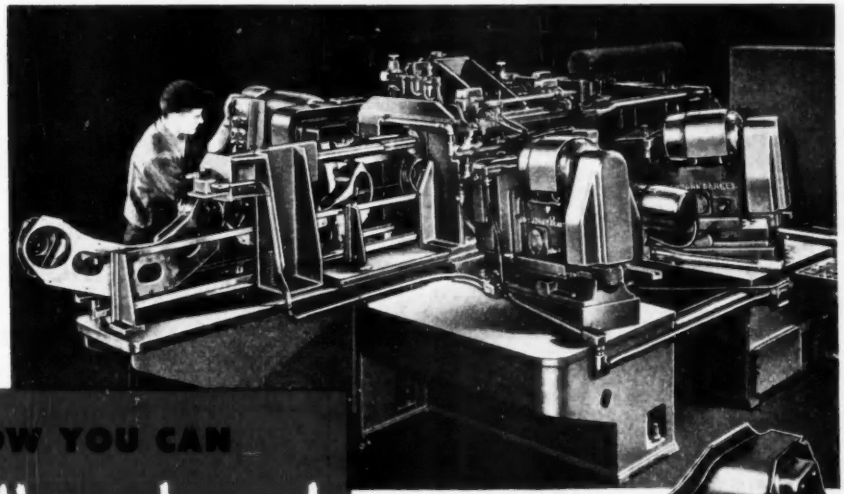
The characteristics of rubber, natural and synthetic,—its effective vibration control, its flexibility, its high coefficient of friction, its resistance to abrasion,—these qualities may be employed to fullest advantage because of the inseparable bond between the rubber and the substantial base to which it is attached.

Valve seats, motor mounts, idler wheels, diaphragms, pirn adapters, torsion joints, bearing seals, are a few of the successful applications which have been made and are suggestive of opportunities for improvement of other products. The Lord Bonded-Rubber Process combines the rigidity and strength of metal with the resiliency of rubber in a permanent bond that withstands strains and stresses of torsion, compression, or other distortion.

The greatest storehouse of practical experience in product improvement, through the application of rubber-bonded-to-metal, is at your service. Consult the Lord representative in your territory, or write

LORD MANUFACTURING COMPANY, ERIE, PA.
Canadian Representative: Railway & Power Engineering Corp. Ltd

LORD Vibration Control Systems

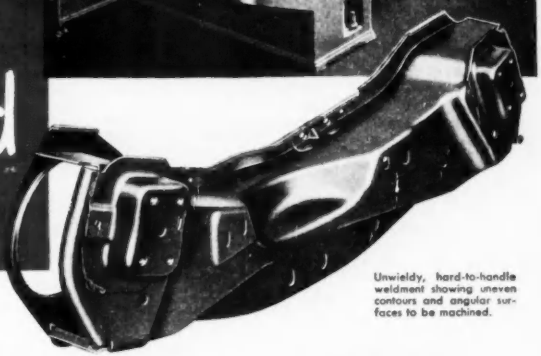


Special 4-Station Progress-Thru Machine showing parts clamped in holding fixture. Note the guide rails.

HOW YOU CAN

handle awkward work like this...

ON A



Unwieldy, hard-to-handle weldment showing uneven contours and angular surfaces to be machined.

W.F.&JOHN BARNES

PROGRESS-THRU MACHINE

Automatic Cycle Permits Production Machining of Odd-Shaped Automotive Front Cross Bar Assembly

Typical Automatic Machining Cycle

1. Load.
2. Advance part to Station No. 1, push-button starts and stops cycle.
3. Locating dowel pins inserted automatically, movable locators placed on angular sides of part.
4. All units advance automatically.
   Drill units operated in standard cycle of rapid approach, feed, rapid return and stop.
   Tapping unit operates in cycle of forward feed through master lead screw, return feed through master lead screw.
   During work cycle, transfer bar automatically returns, thereby setting up transfer mechanism for loading part and for next transfer cycle.
5. After all heads return, dowel pins and locators retract automatically.
6. Unload.

Shape of workpiece is no longer a limiting factor in the use of multiple station progress-thru machines. This is proven by mass production of a difficult-to-handle automotive weldment. This piece is shown. Locating surfaces are at unusual angles, as are the bosses and flanges to be drilled, chamfered, reamed and tapped. Still, *165 parts per hour at 85% efficiency* are easily produced on this W. F. & John Barnes Special Four-Station Progress-Thru Drilling and Tapping Machine.

Locating Dowel Pins, Automatically Inserted, Check Part for Accuracy

Fabricated parts must be made to predetermined limits and shape, otherwise the progress-thru machine will not receive them for further operations. Here the product manufacturer obtains a positive mechanical *inspection service* through the machine itself.

This feature reduces the number of rejects possible through faulty workmanship.

This is only one of many jobs that can be efficiently handled. Barnes engineering design service plus adaptation of different machine units to difficult work makes it practical to use mass production methods on parts ordinarily routed to individual machines.

W.F.&JOHN BARNES

W. F. and JOHN BARNES

312 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

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Advertisers

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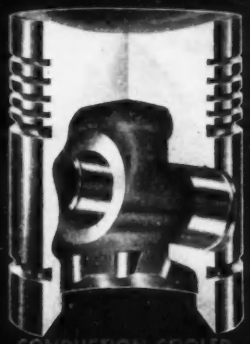
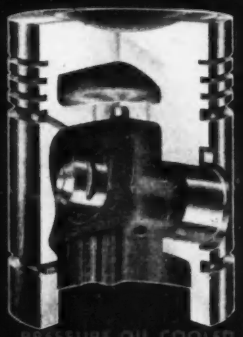
ANY ENGINE IS A BETTER ENGINE WITH PISTONS ENGINEERED BY ZOLLNER



CONDUCTION COOLED



PRESSURE OIL COOLED

SERRATED FINISH

COMPLETE
ENGINEERING COOPERATION

TAILOR-MADE PISTONS FOR YOUR DIESEL ENGINE

Original Equipment in America's Finest Motors

WAUKESHA	MARMON-HERRINGTON
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MACK	FWD
CORBITT	TWIN COACH
DIAMOND-T	IHC
REO	HALL-SCOTT
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FEDERAL	

ZOLLNER

PISTON EQUIPMENT *for* INTERNAL COMBUSTION ENGINES —BOTH GASOLINE AND DIESEL

ZOLLNER MACHINE WORKS
FORT WAYNE, INDIANA

Unmatched

FOR UNIFORMITY, QUALITY, AND STAYING POWER

Everlock Screw-Washer Assemblies are engineered and manufactured to insure that unvarying uniformity so vital to quick, low-cost assembly . . . and dependable performance under all conditions. Precision is the **Everlock** watchword through selection and inspection of steel, control of dies, heat treating and final inspection.

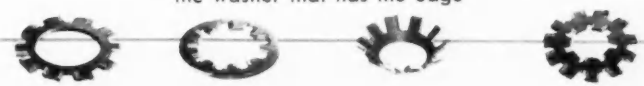
There is a precision-built **Everlock** Screw-Washer Assembly for every need. All types provide the unmatched staying power of non-removable **Everlock** Lock Washers' wide chisel edges. Other important advantages include simplified ordering and stocking, automatic assurance that lock washers are applied where needed for positive resistance to every hazard of vibration, expansion, contraction and strain.

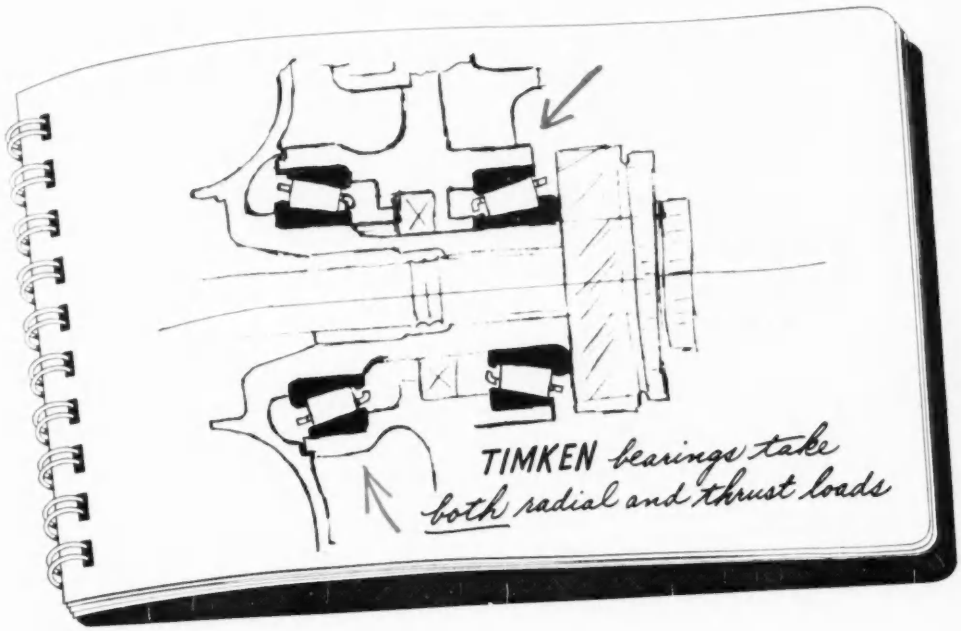
WRITE FOR PARTICULARS

THOMPSON-BREMER & COMPANY, 1642 W. HUBBARD ST., CHICAGO 22, ILL.

THERE'S AN
Everlock
LOCK WASHER
FOR EVERY NEED

the washer that has the edge



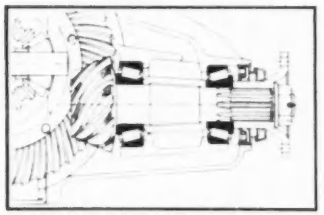


How to parry the thrust in your secret transmission

IF you have a new transmission in the planning stage, here's a thought worth considering before you complete your design: You can eliminate thrust bearings and washers and keep the design simple by using Timken tapered roller bearings.

Timken bearings carry both radial and thrust loads in any combination. They hold moving parts in rigid alignment, eliminate deflection and end-movement. Wear is kept to a minimum. And when gears are used, Timken bearings keep gear teeth meshing smoothly and quietly.

The tremendous load carrying capacity of Timken bearings permit the use of minimum-sized bearings, make space saving possible. Due to their tapered design, they can be taken up during assembly, permitting wider machining tolerances in surrounding parts.



All but two cars use Timken bearings on the pinion. Here's a typical application.

Timken bearings will do for your automatic transmission what they have been doing for years on pinions. The pinion bearing takes more punishment than any other bearing in the automobile—*and all but two makes of passenger cars now use Timken bearings on the pinion.*

The Timken Company has been closely allied with the automotive industry for fifty years, and our engineering facilities are available to help you with your newest design. For assistance with any bearing problem, phone TRinity 5-1580 in Detroit. Or write The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

NOTE TO P. A.'S. *Because every step of the manufacture of Timken bearings is controlled within our company... because our vast manufacturing facilities are widely dispersed... you will find The Timken Roller Bearing Company a supply source of outstanding reliability.*

TIMKEN

TAPERED ROLLER BEARINGS

50th birthday of the company whose products you know by the trade-mark: TIMKEN

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ◫ AND THRUST ◫ LOADS OR ANY COMBINATION ✣